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C. Holman B. Williams

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DEPARTMENT OF AGRICULTURE.

SUGAR BULLETIN No. 9.

FIELD EXPERIMENTS WITH SUGAR CANE, IX.

BY

C. HOLMAN B. WILLIAMS,
Sugar Agronomist and Plant Breeder,

AND

C. CAMERON,
Field Manager.

THE VARIETY AND FERTILISER POSITION OF THE SUGAR INDUSTRY, VI.

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FIELD EXPERIMENTS WITH SUGAR CANE, IX.

BY

C. HOLMAN B. WILLIAMS, *Sugar Agronomist and Plant Breeder,*

AND

C. CAMERON, *Field Manager.*

INTRODUCTION.

The results of thirty-nine variety and eighteen manurial trials, harvested during the year ended June 30, 1940, are recorded in this Bulletin. The experiments have been conducted and the data are presented along the lines described in *Sugar Bulletin* No. 1, except that the analysis of cane samples from the manurial trial plots has been suspended and their results are given only in terms of tons cane per acre.

As a measure of economy the detailed rainfall and soil data for each experimental site have been omitted.

The outstanding feature of the period has been a very severe and prolonged drought which was experienced throughout the sugar belt and of which the following comparisons are typical :—

Comparison of the July—June Rainfall at Sophia Sugar Experiment Station for 1939–40 with the Average for 1921–39.

Month.	Actual Rainfall, 1939—40, in.	Average Rainfall, 1921—39, in.	Excess or Deficit, in.
July	8.53	11.12	— 2.59
August	2.77	8.24	— 5.47
September	2.38	2.66	— 0.28
October	1.29	3.81	— 2.52
November	1.52	5.41	— 3.89
December	1.99	13.53	—11.54
January	5.29	9.34	— 4.05
February	0.63	4.26	— 3.63
March	0.87	4.78	— 3.91
April	1.27	5.63	— 4.36
May	8.11	11.57	— 3.46
June	13.40	14.00	— 0.60
Total	48.05	94.35	—46.30

The effect on the cane breeding and experimental work has been disastrous and will be felt for some time to come. Germination of cane fluff was very poor and mortality among seedlings high at the basket stage as a result of (a) the impossibility of transplanting them at the proper time, (b) the depredations of marauding cattle, deprived of their normal pasturage, and (c) the shortage of suitable water for hand-watering. Plantings could not be made at the right time and in consequence of the cane becoming too old, the extension of promising varieties has been cramped. Despite two and even three attempts at supplying blanks, many experiments present a very irregular stand and in some instances the fields have had to be drawn down and replanted. Routine on the estates and at the Sugar Experiment Station has been so upset that several experiments have been reaped too early or too late.

Cordial thanks are expressed to the Managers and Staffs of the sugar estates for their courtesy and kind co-operation during this trying period.

VARIETY TRIALS.

The variety trials are considered under four sub-sections, *viz.*,

(a) Plant cane variety trials,
(b) First ratoon variety trials,
(c) Second and third ratoon variety trials,
(d) Discussion and summary.

SUB-SECTION A.—PLANT CANE VARIETY TRIALS.

Plant Cane Variety Trials Reaped at Sophia Sugar Experiment Station.

The results of the four plant cane variety trials harvested at the Sophia Sugar Experiment Station are presented in Table I and Figure I.

TABLE I.—**Results of Plant Cane Variety Trials Reaped at Sophia Sugar Experiment Station.**

	Variety.	Cane per Acre, Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre,	
						Tons.	% Mean.
		Field 3 W.	*Reaped*	*2.VIII.39*	*at 13.25*	*months.*	
Means of 5 Plots:	Co. 213	45.20	12.11	8.07	85.1	5.50	129.72
	D. 75/30	42.71	12.62	13.23	85.2	5.37	126.65
	D. 221/33	34.45	13.30	8.45	85.2	4.58	108.02
	P.O.J. 2878	31.05	14.35	7.21	89.7	4.47	105.42
	D. 456/33	29.72	14.73	6.14	88.6	4.39	103.54
	D. 51/33	32.94	12.92	10.37	85.2	4.28	100.94
	D. 49/30	31.78	13.38	6.72	89.9	4.26	100.47
	P.O.J. 2753	33.43	12.71	7.60	87.7	4.26	100.47
	D. 171/34	30.77	13.73	6.64	89.7	4.25	100.24
	D. 39/33	31.26	11.83	10.67	84.3	3.73	87.97
	D. 20/33	27.47	13.45	7.29	88.6	3.69	87.03
	D. 34/33	24.56	13.66	6.19	88.3	3.37	79.48
	D. 24/33	22.91	13.12	9.15	86.1	2.96	69.81
	Mean :					4.24	100.00
	Significant Difference, 20 : 1 :					0.95	22.41
		Field 6 W.	*Reaped*	*28.VI.40*	*at 19.00*	*months.*	
Means of 5 Plots:	D. 456/33	30.87	13.87	7.08	83.8	4.28	117.26
	D. 49/30	32.13	13.11	6.46	85.5	4.21	115.34
	D. 67/30	26.63	15.13	5.61	87.7	4.03	110.41
	D. 166/34	26.95	13.90	5.66	87.4	3.75	102.74
	P.O.J. 2878	27.68	13.55	5.70	85.4	3.75	102.74
	Diamond10	23.30	13.99	5.71	86.2	3.26	89.31
	D. 75/30	28.77	11.12	12.05	80.8	3.20	87.67
	D. 165/34	21.30	12.88	7.40	82.5	2.74	75.07
	Mean :					3.65	100.00
	Significant Difference, 20 : 1 :					0.87	23.84

TABLE I (Contd.).—**Results of Plant Cane Variety Trials Reaped at Sophia Sugar Experiment Station.**

	Variety.	Cane per Acre, Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre,	
						Tons.	% Mean.
		Field 8 W.	*Reaped*	*26. VII. 39*	*at 13.25*	*months.*	
MEANS OF 5 PLOTS :	D. 166/34	23.69	15.07	5.61	90.9	3.67	163.11
	D. 552/33	25.93	13.70	6.39	88.6	3.55	157.78
	D. 169/34	19.20	13.80	5.53	90.6	2.70	120.00
	D. 51/33	18.12	14.62	6.16	90.0	2.66	118.22
	D. 70/34	16.19	14.02	6.95	89.6	2.30	102.22
	D. 121/34	15.52	13.90	6.84	88.3	2.17	96.44
	D. 123/34	15.45	13.63	7.54	89.2	2.14	95.11
	D. 116/34	14.64	14.01	6.34	88.9	2.13	94.67
	P.O.J. 2878	13.14	14.94	7.17	88.5	2.05	91.11
	D. 124/34	14.75	12.95	6.54	88.3	1.99	88.44
	D. 171/34	14.40	13.49	6.52	88.9	1.94	86.22
	D. 118/34	12.75	13.28	7.00	87.3	1.69	75.11
	D. 104/34	14.61	11.31	11.68	81.5	1.66	73.78
	D. 20/33	12.02	12.59	7.08	86.9	1.58	70.22
	D. 170/34	10.76	13.31	5.86	88.4	1.45	64.44
	Mean :					2.25	100.00
	Significant Difference, 20 : 1:					1.16	51.56
		Field 9 W.	*Reaped*	*11. XI. 39*	*at 13.75*	*months.*	
MEANS OF 5 PLOTS :	Co. 213	45.76	14.79	5.58	87.8	6.77	135.13
	P.O.J. 2878	36.58	14.97	3.80	89.8	5.48	109.38
	D. 63/33	33.01	16.58	4.04	90.4	5.47	109.18
	D. 150/30	33.43	16.17	6.14	88.8	5.41	107.98
	D 39/33	34.76	14.65	5.99	88.2	5.09	101.60
	D. 456/33	30.52	16.03	4.55	89.6	4.89	97.60
	D. 75/30	34.86	13.87	10.69	86.5	4.84	96.61
	D. 129/33	27.23	16.11	4.14	90.2	4.39	87.62
	D. 24/33	26.31	14.89	4.87	88.3	3.92	78.25
	D. 221/33	28.87	13.37	12.96	83.0	3.86	77.04
	Mean :					5.01	100.00
	Significant Difference, 20 : 1 :					0.95	18.96

In Field 3 W., tonnages and juices were fair. Co. 213 was definitely better than the standard and D. 75/30 almost so. The only other cane to outyield P.O.J. 2878 was D. 221/33. This cane, however, has not done uniformly well. D. 456/33 (P.O.J. 2878 x Diamond 10), D. 51/33 (D. 666/18 x Diamond 10) and D. 49/30 (D. 625), which followed close behind the standard, are being considered further.

In Field 6 W., owing to the unusual weather conditions, reaping had to be delayed until the cane was 19 months of age. This, combined with a severe rat attack, led to considerable losses in rotten cane. All of the canes tried, except D. 165/34 (P.O.J. 2878 x Sorghum), which came last, had previously given promising results and it is satisfactory to note that all but D. 75/30 compared favourably with P.O.J. 2878 and very favourably with Diamond 10,

D. 456/33 and D. 49/30 being significantly better than the latter. Samples from all the varieties were analysed at 11.5 months and it is of interest to compare the results then obtained with those secured at 19 months :

For All Varieties.

	11.5 Months.		19 Months.	
	Mean.	Range.	Mean.	Range.
Sucrose % Cane	15.24	12.76—16.36	13.44	11.12—15.13
Purity	88.3	82.4 —90.9	84.9	80.8 —87.7
Glucose Ratio	10.04	4.49—20.65	6.96	5.61—12.05

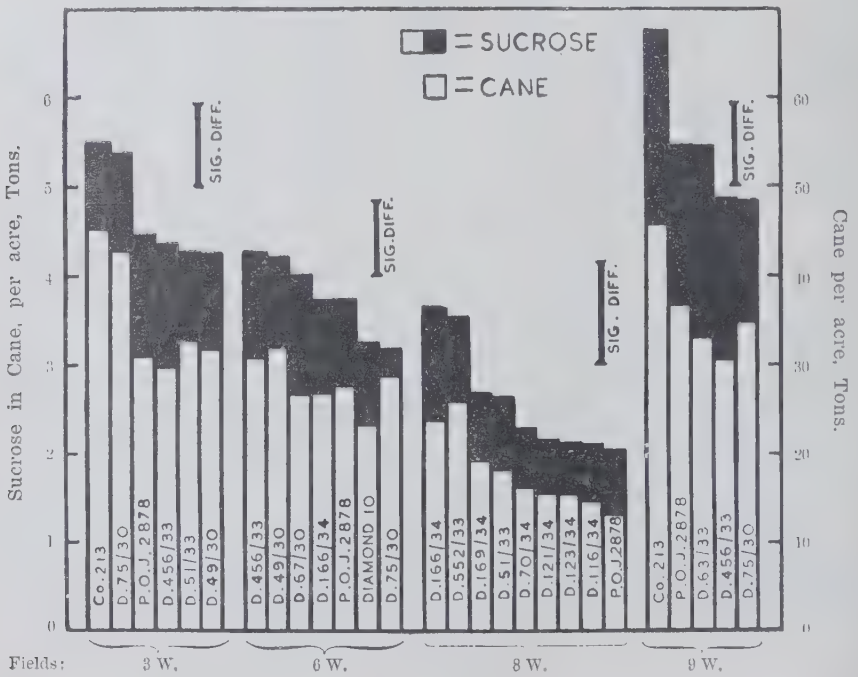
From the point of view of cane quality harvest at 11.5 rather than 19 months would have been preferable. The order of merit of the varieties, as regards sucrose content and juice purity, was very similar at both ages.

In Field 8 W., tonnages were poor but purities high. Compared with P.O.J. 2878, D. 166/34 (P.O.J. 2878 x Sorghum) and D. 552/33 (D. 219/30 x Diamond 10) were outstanding. All of the canes below P.O.J. 2878 will be discarded.

In Field 9 W., tonnages and cane quality were satisfactory. Co. 213 was again definitely better than P.O.J. 2878 and D. 63/33 (D. 666/18 x Diamond 10) gave a yield identical with the standard. D. 75/30 (Badila x D. 625) and D. 221/33 were disappointing.

FIG. I.

Yields from Plant Canes at Sophia.



Plant Cane Variety Trials Reaped in Berbice.

The results of the two plant cane variety trials reaped in Berbice appear in Table II and Figure II.

Table II.—Results of Plant Cane Variety Trials Reaped in Berbice.

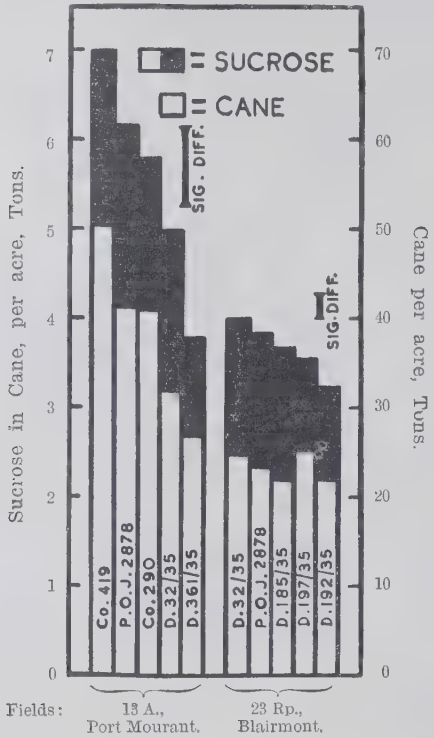
	Variety.	Cane per Acre, Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.
	Pln. Port	*Mourant.*	*Field 13 A.*	*Reaped*	*15.IV.40*	*at 11.75*	*months.*
Means of 5 Plots:	Co. 419	50.19	13.96	7.28	85.0	7.00	126.13
	P.O.J. 2878	41.35	14.89	7.52	86.8	6.16	110.99
	Co. 290	40.99	14.16	4.86	86.3	5.80	104.50
	D. 32/35	31.89	15.64	5.74	90.3	4.99	89.91
	D. 361/35	26.86	14.07	8.89	86.2	3.78	68.11
	Mean:					5.55	100.00
	Significant Difference, 20 : 1 :					0.92	16.58
	Pln. Blair	*mont, Fie*	*ld 23 Rp.*	*Reaped*	*10.V.40*	*at 11.75*	*months.*
Means of 5 Plots:	D. 32/35	24.68	16.25	4.32	90.3	4.01	109.26
	P.O.J. 2878	23.27	16.59	3.92	90.4	3.86	105.18
	D. 185/35	21.71	16.97	4.80	90.2	3.69	100.54
	D. 197/35	25.17	14.09	4.37	86.0	3.55	96.73
	D. 192/35	21.74	14.89	8.33	84.8	3.24	88.28
	Mean:					3.67	100.00
	Significant Difference, 20 : 1 :					0.28	7.63

In Field 13 A., Port Mourant, the recently introduced Co. 419 (P.O.J. 2878 x Co. 290) was outstanding, especially as regards tonnage. If it maintain the promise it has shown here and in the nurseries at Sophia, this cane is likely to be of considerable service. Unlike its male parent, Co. 290 (Co. 221 x D. 74), which gave 6.5 per cent. less than the standard, Co. 419 may be considered a thick cane. D. 32/35 (D. 11/28 x Diamond 10) has been harvested in several trials and has consistently yielded a rich juice even when, as in this instance, harvested early. Its tonnage, however, has not been uniformly good. D. 361/35 will be discarded.

In Field 23 Rp., Blairmont, several of the canes yielded good juices though harvested somewhat early; tonnages were, however, low. D. 32/35 (D. 11/28 x Diamond 10), which topped the list, was definitely better than the last three canes. D. 192/35 will be discarded.

FIG. II.

Yields from Plant Canes at Plns. Port Mourant and Blairmont.



Plant Cane Variety Trials Reaped in East Demerara.

The results of the four plant cane variety trials harvested in East Demerara are presented in Table III and Figure III.

TABLE III.—**Results of Plant Cane Variety Trials Reaped in East Demerara.**

	Variety.	Cane per Acre, Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre,	
						Tons.	% Mean.
	Pln. Lusignan, Field 23 M.X. E. Reaped 27.X.39					*at 13.00*	*months.*
Means of 2 Plots:	D. 456/33	41.83	16.39	10.59	85.3	6.85	117.70
	Diamond 10	36.23	15.70	8.43	84.6	5.69	97.77
	D. 450/33	34.15	16.10	5.29	86.4	5.50	94.50
	P.O.J.2878	33.39	15.67	6.57	86.2	5.23	89.86
	Mean:					5.82	100.00
	Significant Difference, 20 : 1:					—	—
	Pln. La Bonne Intention, Field 38 L.R. Reaped 18.VII.39					*at 12.75*	*months.*
Means of 5 Plots:	P.O.J. 2878	55.04	15.01	6.78	90.9	8.26	112.08
	D. 51/33	54.01	13.75	10.05	88.2	7.43	100.81
	D. 221/33	54.55	11.81	14.18	82.7	6.43	87.25
	Mean:					7.37	100.00
	Significant Difference, 20 : 1:					0.91	12.33
	Pln. Diamond, Field 16 G. Reaped 14.IX.39					*at 15.50*	*months.*
Means of 5 Plots:	Co. 290	26.12	14.27	12.15	88.0	3.73	126.87
	Diamond 10	20.19	16.40	3.93	91.5	3.31	112.58
	D. 24/33	20.18	15.59	5.62	89.0	3.14	106.80
	D. 419/33	21.27	14.65	13.35	89.5	3.12	106.12
	D. 39/33	16.92	13.60	7.61	88.3	2.30	78.23
	D. 118/34	14.18	14.51	4.09	91.0	2.06	70.07
	Mean:					2.94	100.00
	Significant Difference, 20 : 1:					0.68	23.13
	Pln. Diamond, Field 113 G. D. Reaped 16.VIII.39					*at 14.00*	*months.*
Means of 5 Plots:	P.O.J.2878	49.58	14.48	5.66	90.5	7.16	137.96
	D. 109/34	39.75	13.31	8.33	88.4	5.32	102.50
	D. 112/34	41.68	12.20	8.92	85.9	5.06	97.50
	D. 110/34	38.27	13.16	7.55	88.9	4.98	95.95
	D. 104/34	44.62	10.81	15.55	80.8	4.82	92.87
	D. 171/34	30.22	12.59	6.53	89.2	3.81	73.41
	Mean:					5.19	100.00
	Significant Difference, 20 : 1:					1.30	25.05

In Field 23 M.X.E., Lusignan (a trial laid down by the estate authorities), D. 456/33 (P.O.J. 2878 x Diamond 10) led by a wide margin. There was little to choose between Diamond 10 and D. 450/33 (P.O.J. 2878 x Diamond 10), but P.O.J. 2878 held the unusual position of last on the list.

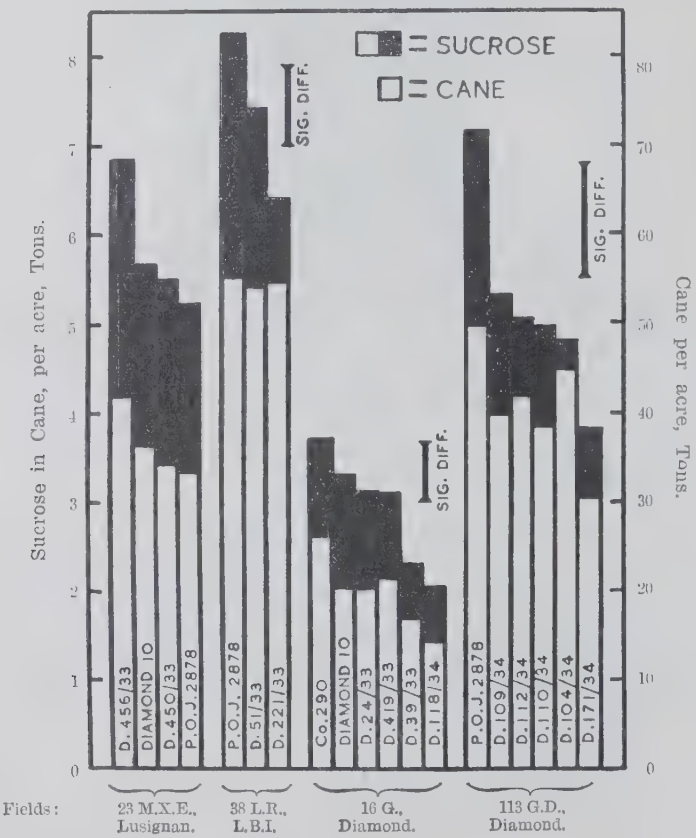
In Field 38 L.R., La Bonne Intention, tonnages were high and practically even for all three canes but owing to a superior juice P.O.J. 2878 led by a wide margin.

In Field 16 G., Diamond, returns were low but juices good. Co. 290 yielded the highest cane tonnage but its lead was somewhat reduced by the excellent juice of Diamond 10, which came second. Close below Diamond 10 were D. 24/33 and D. 419/33, of which the latter, a seedling from Co. 281 x Diamond 10, has a very good record. The last two canes on the list will be discarded.

In Field 113 G.D., Diamond, none of the canes tested approached the yield of P.O.J. 2878 and they have been discarded.

FIG. III.

Yields from Plant Canes at Plns. Lusignan, La Bonne Intention and Diamond.



Plant Cane Variety Trials Reaped in West Demerara.

Table IV and Figure IV display the results from the two plant cane variety trials harvested in West Demerara.

TABLE IV.—**Results of Plant Cane Variety Trials Reaped in West Demerara.**

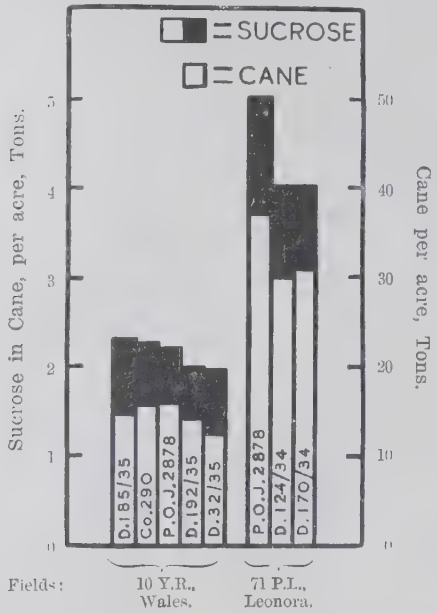
	Variety.	Cane per Acre, Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.
	Pln.	*Wales. Field 10 Y.R.*		*Reaped*	*2.IV.40*	*at 10.75*	*months.*
Means of 5 Plots:	D. 185/35	14.49	16.04	5.55	90.0	2.33	107.37
	Co. 290	15.48	14.78	5.66	90.0	2.29	105.53
	P.O.J.2878	15.60	14.25	7.92	88.4	2.22	102.30
	D. 192/35	14.02	14.28	12.26	83.3	2.00	92.17
	D. 32/35	12.44	16.02	5.98	91.3	1.99	91.70
	Mean:					2.17	100.00
	Significant Difference, 20 : 1 :					—	—
	Pln. Leonora, Field 71 P.L.			*Reaped*	*17.VIII.39 at 13.75 months.*		
Means of 5 Plots:	P.O.J.2878	36.98	13.40	9.61	87.2	5.04	115.60
	D. 124/34	29.92	13.35	8.02	88.3	4.02	92.20
	D. 170/34	30.79	12.77	6.48	87.9	4.02	92.20
	Mean:					4.36	100.00
	Significant Difference, 20 : 1 :					—	—

In Field 10 Y.R., Wales, the combined effects of the drought and very early reaping were reflected in poor tonnages. There was no significant difference between the yields of the various canes but attention may be called to the high quality cane yielded by D. 185/35 (P.O.J. 2878 x D. 66/30) and D. 32/35 (D. 11/28 x Diamond 10).

In Field 71 P.L., Leonora, P.O.J. 2878 led the other canes by a wide margin and they have been discarded.

FIG. IV.

Yields from Plant Canes at Plns. Wales and Leonora.



SUB-SECTION B.—FIRST RATOON VARIETY TRIALS.

FIRST RATOON VARIETY TRIALS REAPED AT SOPHIA SUGAR EXPERIMENT STATION.

The results of the first ratoon variety trials harvested at Sophia Sugar Experiment Station are presented in Table V and Figure V.

TABLE V.—Results of First Ratoon Variety Trials Reaped at Sophia Sugar Experiment Station.

	Variety.	Cane per Acre, Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.	Combined Results for 2 Crops, Plants and 1st Ratoons. Variety.	Sucrose in Cane per Acre, Tons.
		Field	*4 E.*	*Reaped*	*12.VII*	*I.39 at*	*11.75*	*months.*	
MEANS OF 5 PLOTS:	P.O.J. 2878	25.68	14.48	4.96	88.6	3.70	119.74	P.O.J. 2878	7.12
	D. 34/33	21.30	13.23	6.10	86.9	2.81	90.94	D. 34/33	4.78
	D. 39/33	22.91	12.04	6.05	85.0	2.77	89.64	D. 39/33	4.23
	Mean:					3.09	100.00		
	Significant Difference, 20:1:					0.59	19.09		
		Field	*10 W.*	*Reaped*	*9.VIII.*	*39 at*	*11.75*	*months.*	
MEANS OF 5 PLOTS:	D. 63/33	31.57	13.35	5.51	88.3	4.15	118.57	D. 552/33	9.81
	D. 552/33	29.68	12.75	7.22	86.5	3.86	110.29	D. 63/33	9.33
	P.O.J. 2878	23.76	14.74	5.66	89.7	3.53	100.86	D. 67/30	8.85
	D. 67/30	21.94	14.41	5.12	89.8	3.20	91.43	P.O.J. 2878	8.50
	D. 44/33	23.27	11.78	10.13	84.7	2.74	78.29	D. 44/33	6.93
	Mean:					3.50	100.00		
	Significant Difference, 20:1:					0.78	22.29		
		Field	*11 W.*	*Reaped*	*14.XI.*	*39 at*	*11.75*	*months.*	
MEANS OF 5 PLOTS:	D. 419/33	29.50	15.44	6.38	85.5	4.56	142.06	D. 419/33	8.73
	P.O.J. 2878	22.50	14.85	6.85	87.3	3.34	104.05	P.O.J. 2878	6.37
	D. 109/34	21.62	14.50	8.30	86.3	3.14	97.82	D. 109/34	6.27
	D. 116/34	18.61	15.39	5.39	92.0	2.86	89.10	D. 119/34	6.05
	D. 119/34	19.97	14.25	13.46	85.0	2.85	88.78	D. 116/34	5.71
	D. 112/34	19.06	13.21	10.70	84.4	2.52	78.50	D. 112/34	5.59
	Mean:					3.21	100.00		
	Significant Difference 20:1:					0.65	20.25		
		Field	*14 W.*	*Reaped*	*29.VII.*	*39 at*	*12.00*	*months.*	
MEANS OF 5 PLOTS:	P.O.J. 2878	20.43	15.52	5.43	90.2	3.17	109.31	P.O.J. 2878	7.70
	D. 221/33	22.05	12.86	9.17	85.3	2.97	102.41	D. 221/33	7.28
	D. 75/30	19.31	14.42	6.65	89.8	2.76	95.17	D. 75/30	7.16
	D. 44/33	20.39	13.31	7.76	87.4	2.72	93.79	D. 44/33	6.94
	Mean:					2.90	100.00		
	Significant Difference 20:1:					—	—		

In Field 4 E., P.O.J. 2878 was outstanding and the other two seedlings have been discarded.

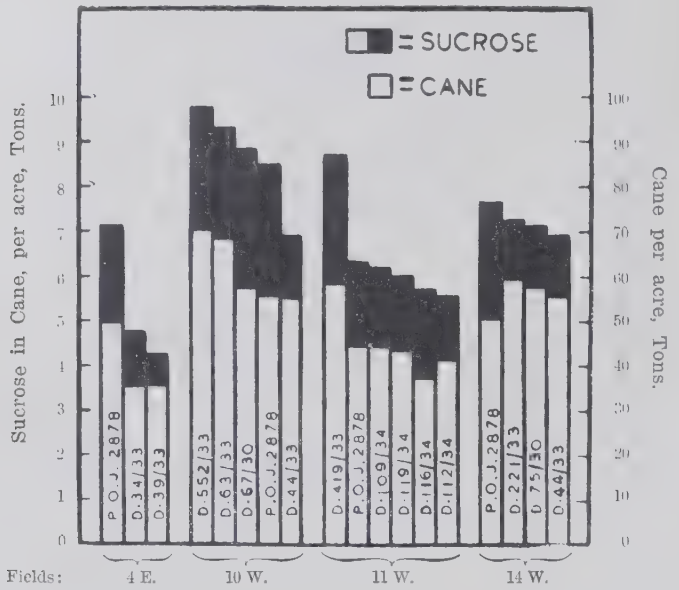
In Field 10 W., the leading varieties were D. 552/33 (D. 219/30 x Diamond 10) and D. 63/33 (D. 666/18 x Diamond 10). Neither has been tested sufficiently and further trials with them have been started.

In Field 11 W., D. 419/33 (Co. 281 x Diamond 10) has proved definitely better than P.O.J. 2878 or any other cane tried. D. 109/34 and D. 112/34 have been discarded.

In Field 14 W., P.O.J. 2878 was ahead of the other canes of which only D. 75/30, having done well in other trials, will be harvested further.

FIG. V.

Yields from Plant Canes and First Ratoons at Sophia.



First Ratoon Variety Trials Reaped in Berbice.

The results of the four first ratoon variety trials harvested in Berbice appear in Table VI and Figure VI.

TABLE VI.—**Results of First Ratoon Variety Trials Reaped in Berbice.**

	Variety.	Cane per Acre, Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.	Combined Results for 2 Crops, Plants and 1st Ratoons. Variety.	Sucrose in Cane per Acre, Tons.
	Pln. Port	*Mour*	*ant, Fie*	*ld 5A.*	*Reaped*	*21.II.*	*40 at*	*11.25 mon*	*ths.*
MEANS OF 5 PLOTS:	P.O.J. 2878	31.80	16.21	7.31	87.6	5.15	121.75	P.O.J. 2878	9.73
	D. 456/33	22.10	15.05	9.36	85.0	3.32	78.49	D. 456/33	7.40
	Mean:					4.23	100.00		
	Significant Difference, 20: 1:					0.55	13.00		
	Pln. Alb	*ion, Fie*	*ld 23B.*		*Reap*	*ed 28.*	*XI.39*	*at 11.*	*75 mon*	*ths.*
MEANS OF 5 PLOTS:	D. 24/33	16.89	15.11	5.64	89.5	2.55	115.38	D. 24/33	7.96
	P.O.J. 2878	14.79	14.06	5.75	90.2	2.08	94.12	D. 39/33	7.29
	D. 39/33	13.38	14.86	6.16	90.3	1.99	90.05	P.O.J. 2878	7.27
	Mean:					2.21	100.00		
	Significant Difference, 20: 1:					0.20	9.05		
	Pln. Blair	*mont,*	*Field*	*2 Ab.*	*Reap*	*ed 7.II.*	*40 at*	*11.75 mon*	*ths.*
MEANS OF 6 PLOTS:	P.O.J. 2878	26.79	15.47	6.96	88.1	4.15	100.48	D. 456/33	9.89
	D. 456/33	26.98	15.23	4.71	89.0	4.11	99.52	P.O.J. 2878	9.51
	Mean:					4.13	100.00		
	Significant Difference, 20: 1:					—	—		
	Pln.	*Bath,*	*Field*	*7 F. Re*	*aped*	*15.V.*	*40 at*	*12.50 mon*	*ths.*
	Co. 213	46.67	13.36	5.74	85.2	6.24	127.87	Co. 213	14.64
MEANS OF 5 PLOTS:	D. 49/30	28.12	17.59	3.82	90.5	4.95	101.43	P.O.J. 2878	14.13
	P.O.J. 2878	28.82	17.07	4.15	88.8	4.92	100.82	D. 456/33	12.37
	D. 456/33	20.65	16.59	4.50	89.5	3.42	70.08	D. 49/30	12.17
	Mean:					4.88	100.00		
	Significant Difference, 20: 1:					0.83	17.01		

In Field 5 A., Port Mourant, P.O.J. 2878 proved definitely superior to D. 456/33 (P.O.J. 2878 x Diamond 10) both as a plant and in total yield for two crops.

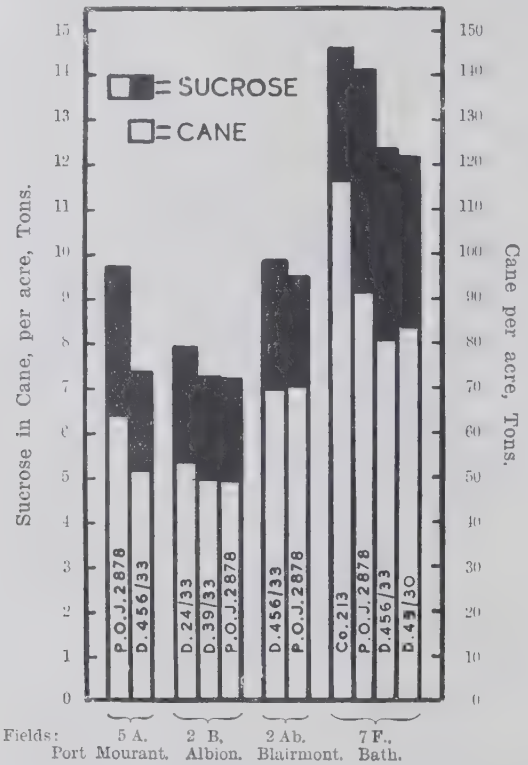
In Field 23 B., Albion, D. 24/33 (S.C. 12/4 x Diamond 10) was the best ratooner and tops the list in total yield for two crops but this cane has given very uneven results and its extension cannot be advised as yet. D. 39/33 will be discarded. Tonnages were low in this trial but juices good.

In Field 2 Ab., Blairmont, P.O.J. 2878 led D. 456/33 by a slight but insignificant margin as a first ratoon. In total yield for two crops, however, D. 456/33 (P.O.J. 2878 x Diamond 10) held the lead.

In Field 7 F., Bath, Co. 213 was significantly better than all competitors as a first ratoon and topped the list in total yield for two crops. D. 49/30 ratooned as well as did P.O.J. 2878 but owing to a lower plant cane yield was below the standard in total output for two crops. D. 456/33 ratooned very poorly. The cane from D. 49/30 was, as usual, of a high quality.

FIG. VI.

Yields from Plant Canes and First Ratoons at Plns. Port Mourant, Albion, Blairmont and Bath.



First Ratoon Variety Trials Reaped in East Demerara.

Table VII and Figure VII present the results secured from the first ratoon variety trials reaped in East Demerara.

Table VII.—**Results of First Ratoon Variety Trials Reaped in East Demerara.**

	Variety.	Cane per Acre, Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.	Combined Results for 2 Crops, Plants and 1st Ratoons. Variety.	Combined Results for 2 Crops, Plants and 1st Ratoons. Sucrose in Cane per acre, Tons.
	Pln. Lusignan, Field 65			*A.W.*	*Reaped 5.11.40. at*			*11.50 months.*	
Means of 5 Plots:	P.O.J. 2878	26.65	13.17	7.46	85.1	3.51	112.50	D. 75/30	7.06
	D. 75/30	26.74	12.02	14.66	81.1	3.21	102.88	P.O.J. 2878	6.26
	D. 456/33	17.75	14.93	6.96	89.8	2.65	84.94	D. 456/33	5.80
	Mean:					3.12	100.00		
	Significant Difference, 20: 1:					—	—		
	Pln. La Bonne Intention, Field 15 F.				*Reaped 7.XI.39 at*			*11.25 months.*	
Means of 5 Plots:	D. 166/34	34.74	16.43	6.34	89.1	5.71	105.74	D. 166/34	13.06
	Diamond 10	32.91	17.06	9.36	88.2	5.62	104.07	D. 51/33	11.21
	D. 51/33	33.05	14.76	16.03	83.8	4.88	90.37	Diamond 10	11.17
	Mean:					5.40	100.00		
	Significant Difference, 20: 1:					0.55	10.19		
	Pln. Diamond, Field 119			*G.D.*	*Reaped*	*14.VII.39 at*		*11.50 months.*	
	P.O.J. 2753	34.25	13.88	7.75	90.1	4.76	113.88	P.O.J. 2878	10.57
Means of 5 Plots:	Co. 213	33.19	13.33	9.08	88.7	4.43	105.98	P.O.J. 2753	9.53
	P.O.J. 2878	27.46	15.70	6.61	92.1	4.30	102.87	Co. 213	9.26
	Diamond 10	22.40	14.60	7.19	91.5	3.25	77.75	Diamond 10	7.33
	Mean:					4.18	100.00		
	Significant Difference, 20: 1:					0.49	11.72		

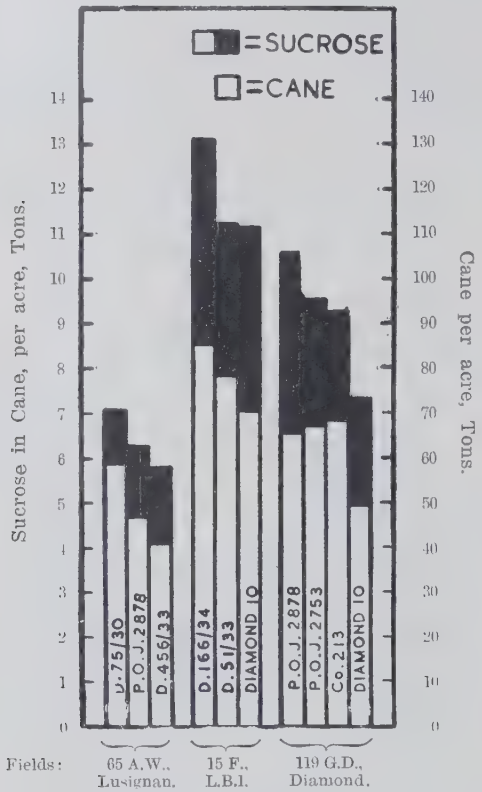
In Field 65 A.W., Lusignan, P.O.J. 2878 topped D. 75/30 (Badila x D. 625) as a first ratoon by reason of its better juice; the latter however still led in total yield for two crops. D. 456/33 (P.O.J. 2878 x Diamond 10) gave a good juice but was disappointing as regards tonnage.

In Field 15 F., La Bonne Intention, D. 166/34 (P.O.J. 2878 x Sorghum) led by a slight margin in the first ratoons and remained well ahead of Diamond 10 in total yield for two crops.

In Field 119 G.D., Diamond, P.O.J. 2753 led all competitors as a ratooner but in total yield for two crops P.O.J. 2878 was outstanding. Diamond 10 was well behind all the varieties tried and the recent tendency to extend P.O.J. 2878 on this estate should be accelerated.

FIG. VII.

Yields from Plant Canes and First Ratoons at Plns. Lusignan, La Bonne Intention and Diamond.



First Ratoon Variety Trials Reaped in West Demerara.

Data from the two first ratoon variety trials reaped in West Demerara are given in Table VIII and shown graphically in Figure VIII.

TABLE VIII.—**Results of First Ratoon Variety Trials Reaped in West Demerara.**

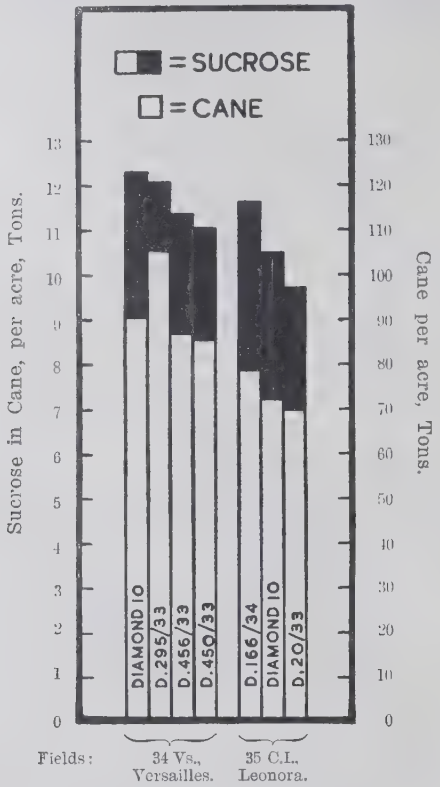
	Variety.	Cane per Acre. Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.	Combined Results for 2 Crops, Plants and 1st Ratoons. Variety.	Sucrose in Cane per Acre. Tons.
	Pln. Versailles, Field 34 V.S. Reaped 17.X.39 at							*11.00 months.*	
Means of 4 Plots:	Diamond 10	44.05	13.89	14.82	86.1	6.12	107.37	Diamond 10	12.33
	D. 295/33	46.90	12.24	25.59	79.7	5.74	100.70	D. 295/33	12.10
	D. 456/33	41.21	13.79	15.27	85.3	5.68	99.65	D. 456/33	11.39
	D. 450/33	41.06	12.85	15.40	82.3	5.28	92.63	D. 450/33	11.06
	Mean:					5.70	100.00		
	Significant Difference, 20 : 1:					—	—		
	Pln. Leonora, Field 35 C.I. Reaped 7.XI.39 at							*12.00 months.*	
Means of 5 Plots:	D. 166/34	31.51	15.14	6.08	88.7	4.77	110.67	D. 166/34	11.64
	Diamond 10	29.78	14.82	5.58	87.8	4.42	102.55	Diamond 10	10.51
	D. 20/33	27.95	13.39	8.14	87.5	3.74	86.77	D. 20/33	9.75
	Mean:					4.31	100.00		
	Significant Difference, 20: 1:					0.59	13.69		

In Field 34 V.S., Versailles, heavy tonnages were recorded and Diamond 10 was the most successful cane as a first ratooner and in total yield for two crops. D. 295/33 (D. 66/30 x D. 625) fell to second place because of its lower sucrose content, and, mainly for this reason, it has been discarded. Because of better results elsewhere, D. 456/33 (P.O.J. 2878 x Diamond 10) is being tested further.

In Field 35 C.I., Leonora, D. 166/34 (P.O.J. 2878 x Sorghum) maintained its promise as a plant cane and in two crops is over a ton of sucrose per acre ahead of Diamond 10. D. 20/33 has been discarded.

FIG. VIII.

Yields from Plant Canes and First Ratoons at Plns. Versailles and Leonora.



SUB-SECTION C.—SECOND AND THIRD RATOON VARIETY TRIALS.

Second Ratoon Variety Trials Reaped at Sophia Sugar Experiment Station.

Data from the eight second ratoon variety trials harvested at the Sophia Sugar Experiment Station are presented in Table IX and Figure IX.

TABLE IX.—**Results of Second Ratoon Variety Trials Reaped at Sophia Sugar Experiment Station.**

	Variety.	Cane per Acre, Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre,		Combined Results for 3 Crops, Plants, 1st, and 2nd Ratoons.	
						Tons.	% Mean.	Variety.	Sucrose in Cane per acre, Tons.
		Field	*13 E.*	*Reaped*	*27.VI.*	*40 at*	*16.00*	*months.*	
MEANS OF 5 PLOTS:	P.O.J. 2878	19.43	11.76	5.70	85.4	2.28	102.70	P.O.J. 2878	8.11
	D. 75/30	18.10	11.98	6.91	84.4	2.17	97.75	D. 75/30	7.84
	Mean:					2.22	100.00		
	Significant Difference, 20 : 1:					—	—		
		Field	*14 E.*	*Reaped*	*9.XI.*	*39 at*	*11.75*	*months.*	
MEANS OF 6 PLOTS:	P.O.J. 2878	16.47	13.23	11.94	85.1	2.18	114.14	P.O.J. 2878	8.00
	D. 67/30	11.82	13.97	6.41	85.9	1.65	86.39	D. 67/30	6.14
	Mean:					1.91	100.00		
	Significant Difference, 20 : 1:					0.15	7.85		
		Field	*16 E.*	*Reaped*	*28.X.*	*39 at*	*12.00*	*months.*	
MEANS OF 5 PLOTS:	P.O.J. 2878	25.93	14.28	1.27	89.3	3.70	100.54	P.O.J. 2878	11.36
	D. 75/30	26.38	13.89	2.17	85.4	3.67	99.73	D. 75/30	11.13
	Mean:					3.68	100.00		
	Significant Difference, 20 : 1:					—	—		
		Field	*17 E.*	*Reaped*	*26.X.*	*39 at*	*12.00*	*months.*	
MEANS OF 4 PLOTS:	D. 24/33	23.34	15.12	7.32	90.3	3.53	105.37	P.O.J. 2878	10.86
	P.O.J. 2878	21.59	14.70	6.59	88.6	3.17	94.63	D. 24/33	9.40
	Mean:					3.35	100.00		
	Significant Difference, 20 : 1:					—	—		
		Field 4	*W. (A)*	*Reaped*	*8.XI.*	*39 at*	*12.00*	*months.*	
MEANS OF 5 PLOTS:	P.O.J. 2878	27.05	16.32	4.79	90.7	4.41	100.23	P.O.J. 2878	13.78
	P.O.J. 2753	30.87	14.23	5.56	88.1	4.39	99.77	P.O.J. 2753	12.81
	Mean:					4.40	100.00		
	Significant Difference, 20 : 1:					—	—		

TABLE IX (Contd.)—**Results of Second Ratoon Variety Trials Reaped at Sophia Sugar Experiment Station.**

	Variety.	Cane per Acre, Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.	Combined Results for 3 Crops. Plants, 1st and 2nd Ratoons. Variety.	Combined Results for 3 Crops. Plants, 1st and 2nd Ratoons. Sucrose in Cane per Acre, Tons.
		Field 4	*W. (D)*	*Reaped*	*8.XI.39 at*		*12.00*	*months.*	
MEANS OF 5 PLOTS:	D. 39/33	31.26	15.00	6.29	88.7	4.69	103.30	D. 39/33	14.56
	P.O.J. 2878	26.91	16.33	4.93	90.2	4.39	96.70	P.O.J. 2878	13.14
	Mean:					4.54	100.00		
	Significant Difference, 20 : 1:					—	—		
		Field	*13 W.*	*Reaped*	*25.VI.40 at*		*14.00*	*months.*	
MEANS OF 5 PLOTS:	P.O.J. 2878	20.84	13.52	3.99	84.5	2.82	103.68	D. 75/30	9.57
	D. 75/30	20.09	13.07	5.38	86.2	2.63	96.69	P.O.J. 2878	8.43
	Mean:					2.72	100.00		
	Significant Difference, 20: 1:					—	—		
		Field	*16 W.*	*Reaped*	*30.X.39 at*		*11.50*	*months.*	
MEANS OF 5 PLOTS:	D. 419/33	30.10	15.17	11.56	87.8	4.56	128.45	D. 419/33	11.73
	D. 34/33	29.75	14.22	14.70	86.2	4.23	119.15	D. 34/33	9.45
	P.O.J. 2878	23.79	15.55	5.90	88.2	3.70	104.23	D. 150/30	9.03
	D. 30/33	23.79	15.22	5.54	88.1	3.62	101.97	D. 30/33	8.58
	D. 8/33	22.08	15.81	6.51	87.8	3.49	98.31	P.O.J. 2878	8.37
	D. 39/33	18.96	14.49	6.77	87.6	2.74	77.18	D. 8/33	8.25
	D. 150/30	15.66	16.11	7.54	88.2	2.52	70.99	D. 39/33	6.68
	Mean:					3.55	100.00		
	Significant Difference, 20: 1:					0.70	19.72		

In Field 13 E., tonnages, in view of the prolonged drought, were fair but the advent of the rains produced a drop in purity. P.O.J. 2878 outyielded D. 75/30 by 5 per cent. as a second ratoon and led by 0.27 ton sucrose in total yield for three crops.

In Field 14 E., returns were low. P.O.J. 2878 definitely outyielded D. 67/30 as a second ratoon and was well ahead in total yield for three crops.

In Field 16 E., yields were satisfactory and the two canes gave practically identical returns both as second ratoons and in total yield for three crops.

In Field 17 E., D. 24/33 gave a better second ratoon yield than P.O.J. 2878 but was beaten by the standard in total returns for three crops.

In Field 4 W., Experiment A, P.O.J. 2878 and P.O.J. 2753 gave similar yields as second ratoons but the former was superior in total yield for three crops.

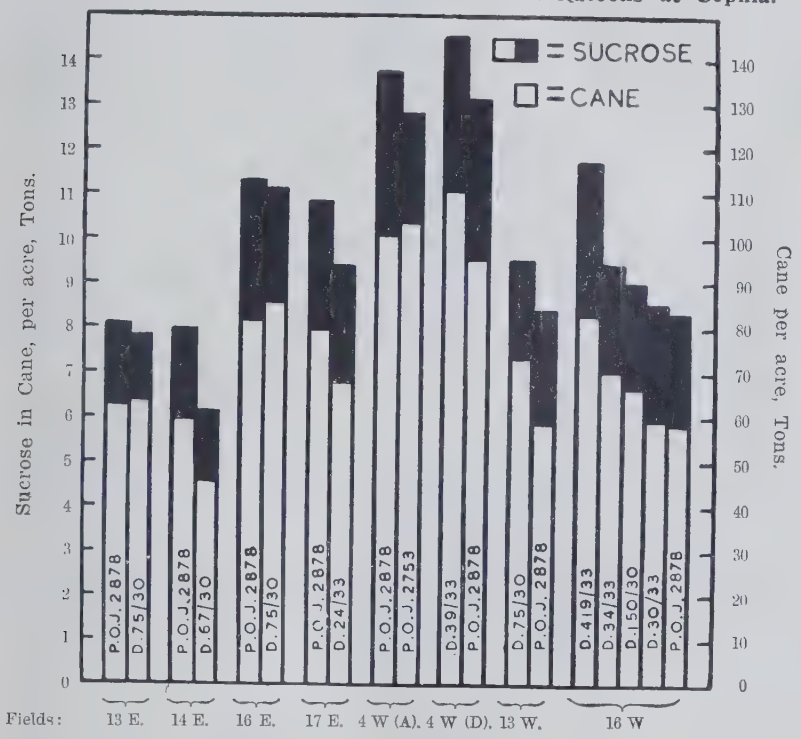
In Field 4 W., Experiment D, D. 39/33 was superior as a second ratoon and in total yield for three crops but results from this seedling at other sites have not been satisfactory.

In Field 13 W., tonnages were satisfactory but purities somewhat low, although D. 75/30 proved better than the standard in this respect. P.O.J. 2878 outyielded D. 75/30 by 7 per cent. as a second ratoon but in total return for three crops the latter led the standard by 1.14 ton sucrose per acre.

In Field 16 W., yields were satisfactory and D. 419/33 (Co. 281 x Diamond 10) was definitely better than P.O.J. 2878. D. 150/30, D. 34/33 and D. 39/33 have been discarded.

FIG. IX.

Yields from Plant Canes, First and Second Ratoons at Sophia.



Second Ratoon Variety Trials Reaped in Berbice.

Data from the two second ratoon variety trials harvested in Berbice are presented in Table X and Figure X.

Table X.—**Results of Second Ratoon Variety Trials Reaped in Berbice.**

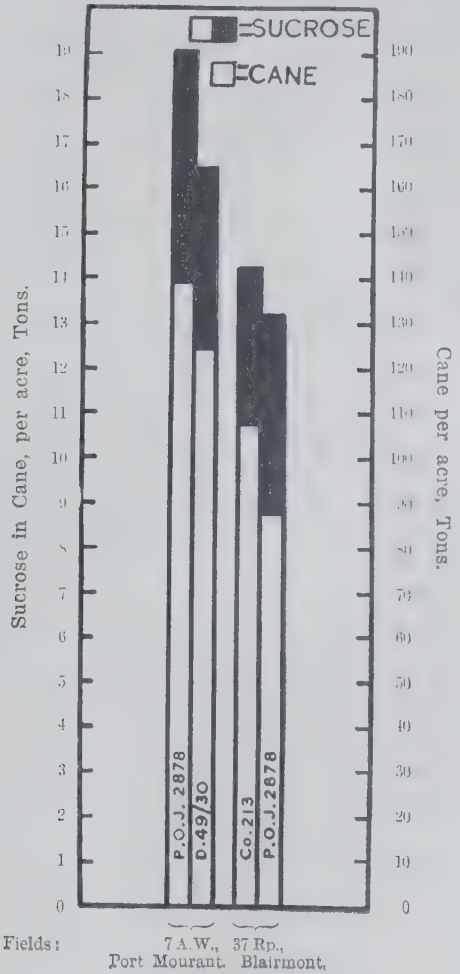
	Variety.	Cane per Acre, Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.	Combined Results for 3 Crops, Plants, 1st and 2nd Ratoons. Variety.	Sucrose in Cane per Acre Tons.
	Pln. Port Mourant, Field 7 A.W. Reaped 26.VII.39							*at 10.50 months.*	
Means of 4 Plots:	D. 49/30	39.48	13.25	6.75	88.9	5.23	101.16	P.O.J. 2878	19.12
	P.O.J. 2878	37.26	13.85	8.76	87.7	5.11	98.84	D. 49/30	16.46
	Mean:					5.17	100.00		
	Significant Difference, 20:1:					—	—		
	Pln Blairmont, Field 37 Rp. Reaped 8.II.40 at							*10.75 months.*	
Means of 5 Plots:	Co. 213	26.72	13.89	4.66	87.3	3.71	113.46	Co. 213	14.24
	P.O.J. 2878	18.07	15.64	3.60	89.7	2.83	86.54	P.O.J. 2878	13.21
	Mean:					3.27	100.00		
	Significant Difference, 20: 1:					0.20	6.12		

In Field 7 A.W., Port Mourant, D. 49/30 led P.O.J. 2878 by a slight and insignificant margin as a second ratoon but was heavily outyielded by the standard in total output for three crops. Tonnages and juices were good for ten and a half month cane.

In Field 37 Rp., Blairmont, Co. 213 was very definitely superior to P.O.J. 2878 as a second ratoon, and in three crops gave over a ton of sucrose per acre more than the standard.

FIG. X.

Yields from Plant Canes, First and Second Ratoons at Plns. Port Mourant and Blairmont.



Second Ratoon Variety Trials Reaped in Demerara.

The results of the two second ratoon variety trials harvested in Demerara are presented in Table XI and Figure XI.

TABLE XI.—Results of Second Ratoon Variety Trials Reaped in Demerara.

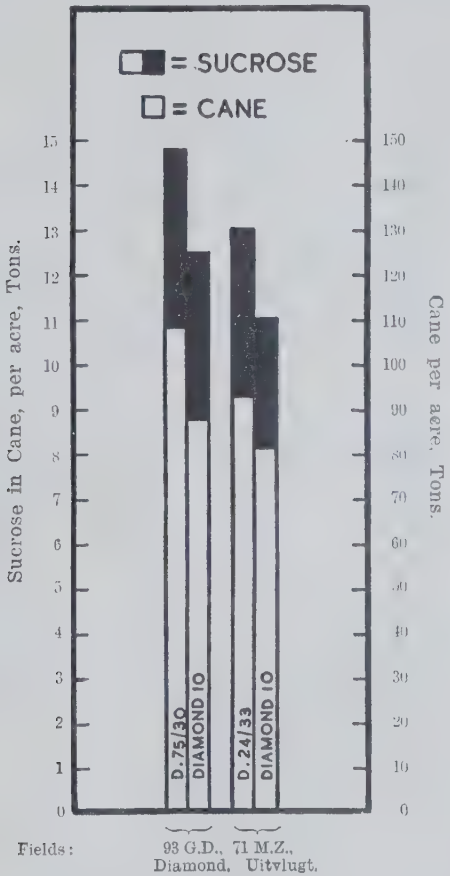
	Variety.	Cane per Acre, Tons.	Sucrose in Cane, %.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.	Combined Results for 3 Crops, Plants, 1st and 2nd Ratoons. Variety.	Combined Results for 3 Crops, Plants, 1st and 2nd Ratoons. Sucrose in Cane per Acre, Tons.
	Pln. Diamond, Field 93 G.D. Reaped 25.VII.39 at							*11.59 months.*	
Means of 5 Plots:	D. 75/30	25.93	13.32	12.80	85.5	3.46	105.81	D. 75/30	14.84
	Diamond 10	21.27	14.51	7.19	90.5	3.08	94.19	Diamond 10	12.54
	Mean:					3.27	100.00		
	Significant Difference, 20: 1:					—	—		
	Pln. Uitvlugt, Field 71 M.Z. Reaped 10.XI.39 at							*12.00 months.*	
Means of 5 Plots:	D. 24/33	27.13	14.97	6.86	91.1	4.06	104.37	D. 24/33	13.06
	Diamond 10	24.38	15.24	5.09	89.7	3.72	95.63	Diamond 10	11.07
	Mean:					3.89	100.00		
	Significant Difference, 20: 1:					—	—		

In Field 93 G.D., Diamond, D. 75/30 (Badila x D. 625) ratooned better than Diamond 10 and was well ahead of the latter in total yield for three crops. D. 75/30 yields a heavy tonnage of cane, especially as a plant, but its juice is usually inferior to that of Diamond 10.

In Field 71 M.Z., Uitvlugt, D. 24/33 (S.C. 12/4 x Diamond 10) proved superior to Diamond 10 which it led by a wide margin in total yield for three crops. However, the results from D. 24/33 to date have been very uneven.

FIG. XI.

Yields from Plant Canes, First and Second Ratoons at Plns. Diamond, and Uitvlugt.



THIRD RATOON VARIETY TRIALS.

It is not usual to harvest variety trials as third ratoons but this was done at two sites during the period under review and it is of interest to note the main conclusions.

In Field 14 E.W., Providence, Berbice, D. 49/30 and Co. 213 outyielded P.O.J. 2878 and Diamond 10 as third ratoons by 0.6 ton sucrose per acre.

In Field 76 A., Lusignan, Co. 213 gave over a ton of sucrose per acre more than Diamond 10 as a third ratoon and led by nearly 4 tons of sucrose per acre in total yield for four crops.

SUB-SECTION D.—DISCUSSION AND SUMMARY OF RESULTS.

Table XII summarises, for all experiments, the relative status of the varieties which have been reaped as plant canes, first and second ratoons.

TABLE XII.—**Mean Sucrose Yields from Three Crops.**

Variety.	Mean Sucrose, Tons per acre (Corrected Values).				Total Yield, P.O.J. 2878 =100.0
	Plants.	First Ratoons.	Second Ratoons.	Total.	
D. 419/33	*5.79*	6.55	4.37	16.71	132.83
Co. 213	**4.75**	**4.20**	**4.15**	**13.10**	**104.13**
D. 30/33	5.61	3.76	3.47	12.84	102.07
D. 8/33	4.91	4.46	3.35	12.72	101.11
P.O.J. 2878	**5.02**	**4.01**	**3.55**	**12.58**	**100.00**
D. 24/33	**4.33**	*4.11*	4.04	12.48	99.20
D. 75/30	**5.32**	**3.65**	**3.41**	**12.38**	**98.41**
Diamond 10	**4.77**	**3.69**	**3.78**	**12.24**	**97.30**
D. 49/30	**4.52**	**3.86**	**3.86**	**12.24**	**97.30**
D. 67/30	**5.17**	*3.58*	*3.47*	*12.22*	*97.14*
P.O.J. 2753	*4.21*	*4.12*	*3.85*	*12.18*	*96.82*
D. 150/30	**4.91**	*4.01*	2.95	11.87	94.36
D. 34/33	*3.81*	3.85	4.06	11.72	93.16
D. 39/33	**4.33**	*3.94*	3.26	11.53	91.65

NOTE :—**Heavy type indicates means of six or more tests;**
Italics indicate means of three to five tests;
Ordinary type indicates one test or mean of two.

D. 419/33 (Co. 281 x Diamond 10) has been reaped thrice as plant canes, twice as first ratoons and once as second ratoons. Its record so far has been highly satisfactory both as regards tonnage and juice quality. It is being tested further and in the meantime material for the establishment of nurseries has been distributed. A further supply of cuttings will be available in December next.

Co. 213 has been fully tested and no further trials with this cane will be started, although those in progress will be carried through their complete cycle. In a three-crop cycle this variety has outyielded P.O.J. 2878 by four per cent., and this margin is likely to be widened when all the trials have been harvested as second ratoons. The figures indicate that Co. 213 is a better ratooner than P.O.J. 2878 and it may be deduced that in a four or five-crop cycle the Indian cane would have a marked advantage. This is partly confirmed by the harvest of two third ratoon tests of this cane : at Providence, Berbice, it outyielded P.O.J. 2878 by 15% and at Lusignan it outyielded Diamond 10 by 27%. Despite its thin stalks, Co. 213 merits extensive commercial tests on all estates.

D. 30/33 (S.C. 12/4 x Diamond 10) and D. 8/33 (D. 53/27 x Diamond 10) have only appeared so far in one experiment each. Their cane is equal in quality to that of P.O.J. 2878 and they will be tested further.

D. 24/33 (S.C. 12/4 x Diamond 10) has given very uneven results so far.

D. 75/30 (Badila x D. 625) may be considered as slightly superior to Diamond 10 and slightly inferior to P.O.J. 2878 in yield of sucrose over three crops. It excels as a plant cane but is only a fair to mediocre ratooner. It does not ripen as well as does P.O.J. 2878 or Diamond 10.

D. 49/30 (D. 625) has been amply tested and, taking experiments all over the Colony, has given the same average yield over three crops, as Diamond 10. In certain areas however, it surpasses the Diamond seedling and some encouraging reports on small commercial tests have been received from various estates. An increase in the number of such small plantings would be of great assistance in determining the conditions under which D. 49/30 thrives and in finally fixing its status. It yields a cane of high quality.

D. 67/30 (Diamond 10 x S.C. 12/4) has not been as well tested as D. 49/30 but approximates the latter very closely in yield. Its juice is quite satisfactory.

The remaining canes on the list will be discarded.

Table XIII summarises the results from all experiments with varieties reaped as plant canes and first ratoons only.

TABLE XIII.—Mean Sucrose Yields from Two Crops.

Variety.	Mean Sucrose, Tons per acre (Corrected Values).			Total Yield, P.O.J. 2878 =100.0
	Plants.	First Ratoons.	Total.	
D. 552/33	6.79	4.38	11.17	123.70
D. 166/34	*6.01*	3.85	9.86	109.19
D. 63/33	5.12	4.71	9.83	108.86
P.O.J. 2878	**5.02**	**4.01**	**9.03**	**100.00**
D. 119/34	5.30	3.42	8.72	96.57
Diamond 10	**4.77**	**3.69**	**8.46**	**93.69**
D. 116/34	4.92	3.43	8.35	92.47
D. 456/33	**5.09**	**3.25**	**8.34**	**92.36**
D. 51/33	*5.04*	3.20	8.24	91.25
D. 450/33	**4.70**	3.41	8.11	89.81
D. 221/33	*4.23*	3.76	7.99	88.48
D. 295/33	4.50	3.46	7.96	88.15
D. 109/34	4.16	3.77	7.93	87.82
D. 44/33	*4.57*	3.27	7.84	86.82
D. 20/33	*4.38*	3.12	7.50	83.06
D. 112/34	4.00	3.03	7.03	77.85

NOTE :—**Heavy type indicates means of six or more tests ;**
Italics indicate means of three to five tests ;
Ordinary type indicates one test or mean of two.

D. 552/33 (D. 219/30 x Diamond 10), which heads the list, has been reaped twice as a plant and once as a first ratoon. It yields more cane than P.O.J. 2878 but its juice is not quite as good. Further experiments with this cane will be undertaken.

D. 166/34 (P.O.J. 2878 x Sorghum) has been harvested four times as a plant and twice as a first ratoon. It yields heavy tonnages of good quality cane with stalks thicker than those of P.O.J. 2878, is drought-resistant and 'covers in' remarkably early. Most estates now have some of this cane in their nurseries and the reports, so far secured, are very encouraging.

D. 63/33 (D. 666/18 x Diamond 10) has appeared in two plant cane trials and one first ratoon. Unlike most of the seedlings from D. 666/18, it yields a good quality cane. It will be tested further.

D. 119/34 (D. 11/28 x Diamond 10) has only appeared in one trial so far.

D. 456/33 (P.O.J. 2878 x Diamond 10) has been well tested as a plant (10 times) and is evidently as good as P.O.J. 2878 in this respect. Its ratooning so far, however, has not been impressive. Its juice is good and some small commercial plantings have given satisfactory returns.

D. 116/34 and D. 51/33 will be given some further consideration, but D. 450/33 and the varieties below it in the list will be discarded.

The canes listed in Table XIV have been tested only as plants.

TABLE XIV.—Mean Sucrose Yields from Plant Canes.

Variety.	Mean Sucrose, Tons per acre (Corrected Values). Plants.	Yield, P.O.J. 2878=100.0
D. 169/34	6.61	131.67
Co. 419	5.70	113.55
D. 70/34	5.63	112.15
D. 121/34	5.31	105.78
D. 123/34	5.24	104.38
P.O.J. 2878	**5.02**	**100.00**
Co. 290	*5.00*	*99.60*
D. 185/35	4.97	99.00
Diamond 10	**4.77**	**95.02**
D. 197/35	4.62	92.03
D. 32/35	*4.51*	*89.84*
D. 192/35	4.33	86.25
D. 124/34	4.26	84.86
D. 129/33	4.02	80.08
D. 170/34	3.87	77.09
D. 110/34	3.69	73.51
D. 171/34	*3.67*	*73.11*
D. 165/34	3.67	73.11
D. 104/34	3.53	70.32
D. 118/34	3.40	67.73
D. 361/35	3.08	61.35

NOTE:—**Heavy type indicates means of six or more tests;**
Italics indicate means of three to five tests;
Ordinary type indicates one test or mean of two.

The five varieties at the head of the list have each appeared in a single experiment only and must be tested further. Co. 419 (Co. 290 x P.O.J. 2878) is a thick cane whose growth in the Experiment Station's nurseries leaves little doubt as to its high field merit for this Colony.

Co. 290 is a thin cane which has been tested thrice as a plant and has approximated very closely to P.O.J. 2878 in that respect.

D. 185/35 (P.O.J. 2878 x D. 66/30) has been tested twice and is also very close to P.O.J. 2878 as a plant cane yielder.

With the exception of D. 165/34 (P.O.J. 2878 x Sorghum), which had the misfortune in its single experiment to meet a combination of unusually adverse conditions, all the varieties below D. 192/35 have been discarded.

Recommendations:

Estates are advised to

(a) make commercial tests with Co. 213 and D. 49/30;
(b) extend their nurseries of D. 166/34 as rapidly as possible;
(c) establish nurseries of D. 419/33.

MANURIAL TRIALS.

The results of the eighteen manurial trials reaped during the period under review, are recorded under six sub-sections, *viz.* :—

A—Nitrogenous manures

B—Phosphatic manures

C—Potassic manures

D—Liming materials

E—Manganese ore

F—Discussion and summary.

Certain experiments, involving manures which contain both nitrogen and phosphate, are treated, for convenience, under sub-section A (A 3—A 8 and A 13—A 16), and in this respect there is some overlapping between sub-sections A and B.

Several trials (A 1, A 2, and A 9 to A 12) were of a complex nature, involving graded dressings of nitrogen, phosphate and potash. The response to each element is discussed under the appropriate sub-section.

The results are presented in terms of yield of cane per acre, the analysis of samples from the manurial plots having been suspended. A discussion of the effects of fertilisers on cane quality will be found in sub-section F.

SUB-SECTION A.—NITROGENOUS MANURES.

(A 1—A 2) Sulphate of Ammonia on Flood-Fallowed Frontland (Second and Third Ratoons, P.O.J. 2878).

Fields 20 R., Port Mourant; and 26 Rp., Blairmont.

(*Plant cane results reported in Sugar Bull. No. 6, p. 57.*)
(*First ratoon results reported in Sugar Bull. No. 7, p. 70 and No. 8, p. 49.*)
(*Second ratoon results reported in Sugar Bull, No. 8, p. 52.*)

The results of these tests, which appear in Table XV and Figure XII, confirm previous findings that 4 cwt. sulphate of ammonia per acre is the minimum application required for ratoons growing on frontland and, indeed, the data from Field 20 R., Port Mourant, suggest that higher doses will sometimes pay. This latter point is dealt with more fully in the Discussion and Summary.

TABLE XV.

Effect of Sulphate of Ammonia on Second and Third Ratoons of P.O.J. 2878 on Flood-fallowed Frontland.

	Sulphate of Ammonia, per Acre,			Significant Difference, 20 : 1
	2 Cwt.	4 Cwt.	6 Cwt.	
	Pln. Port Mourant, Field 20 R., Second Ratoons.			
Tons Cane/Acre	25.58	28.67	34.00	3.44
	Pln. Blairmont, Field 26 Rp., Third Ratoons.			
„ „ „	36.05	40.43	41.29	2.95

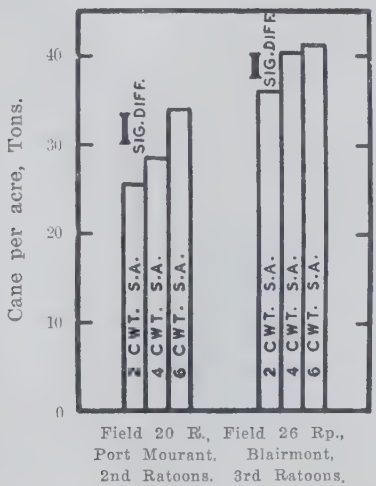


FIG. XII.

Effect of Sulphate of Ammonia on P.O.J. 2878 on Flood-fallowed Frontland.

(A 3) Nitrogenous and Phosphatic Manures on Flood-Fallowed Frontland (Plant Canes, P.O.J. 2878).

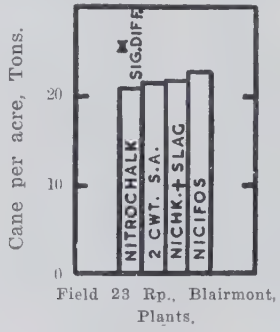
Field 23 Rp., Blairmont.

At this site (see Table XVI and Figure XIII), Nicifos definitely outyielded the other fertilisers tried. The profit from its use, under these conditions, in preference to a nitrogen-equivalent dose of sulphate of ammonia would, however, be inconsiderable. The differences between the yields from the three other treatments were no greater than might be attributable to chance. Comparing the two dressings which carried phosphate with the two without, there was a definite response to that element, but the difference would hardly prove economic.

Table XVI.

Effect of Various Nitrogenous and Phosphatic Manures on Plant Canes of P.O.J. 2878 on Flood-fallowed Frontland.

	Lb. per Acre				Significant Difference, 20 : 1
	N 47 P_2O_5 47 as Nicifos.	N 47 P_2O_5 47 as N/chalk and B. Slag.	N 47 as S. of Amm.	N 47 as Nitro-chalk.	
Tons Cane/Acre	22.76	21.64	21.49	20.95	1.11



Field 23 Rp., Blairmont, Plants.

Fig. XIII.

Effect of Nitrogenous and Phosphatic Manures on P.O.J. 2878 on Flood-fallowed Frontland.

(A 4—A 6) Nitrogenous and Phosphatic Manures on Flood-Fallowed Frontland (First Ratoons).

Fields 23 B., Albion; 34 V.S., Versailles; and 35 C.I., Leonora.

(*Plant cane results reported in Sugar Bull. No. 8, p. 56.*)

Confirming the plant cane results, it will be seen from Table XVII that the differences in yield obtained from the various treatments are within the limits due to chance and it must be concluded that Nicifos, Nitrochalk and sulphate of ammonia are equally efficient sources of nitrogen under the conditions of these trials. Further, no definite beneficial effect from the phosphate dressing of the Nicifos has been demonstrated although there was a suggestion of such at Albion in the plants and at Versailles in the first ratoons.

Table XVII.

Effect of Various Nitrogenous and Phosphatic Manures on First Ratoons on Flood-fallowed Frontland.

	Lb. per Acre			Significant Difference,
	N 94 P_2O_5 94 as Nicifos.	N 94 as Nitrochalk.	N 94 as S. of Amm.	20:1
	Pln. Albion, Field 23		*Belvedere.*	
Tons Cane/Acre	27.77	24.53	28.78	...
	Pln. Versailles, Field 34		*Versailles.*	
,, ,, ,,	44.09	41.47	39.39	...
	Pln. Leonora, Field 35 Cornelia Ida.			
,, ,, ,,	31.71	29.99	33.64	...
	Combination of Three Experiments.			
,, ,, ,,	34.52	32.00	33.94	...

(A 7—A 8) Nitrogenous and Phosphatic Manures on Flood-Fallowed Frontland (First Ratoons, P.O.J. 2878).

Fields 1 F.F.A. and 31 S., Pln. Rose Hall.

(Plant cane results reported in Sugar Bull. No. 8, p. 58.)

Both these fields were treated as plants and as first ratoons but it was not possible to weigh the plots in 31 Smithson as plants. In that crop phosphate definitely increased the yield of cane and sugar per acre in 1 Field-Field A but adversely affected sucrose content, juice purity and glucose ratio. On the other hand there were no definite differences attributable to the form in which nitrogen or phosphate was applied.

The first ratoon yields were mediocre and, as will be seen from Table XVIII, the results were by no means clear cut. In 1 F.F.A., Nitrochalk was definitely less efficient than sulphate of ammonia, and Nitrochalk and basic slag inferior to the other combinations of nitrogen and phosphate as well as to sulphate of ammonia alone. On the other hand there was no significant response to phosphate. The yield differences in 31 S. did not exceed the limits which might be due to chance. Nitrochalk again appeared inferior to sulphate of ammonia alone, but in combination with basic slag it gave the highest yield.

Table XVIII.

Effect of Various Nitrogenous and Phosphatic Manures on First Ratoons of P.O.J. 2878 on Flood-fallowed Frontland.

	Lb. per Acre						
	N 94 P_2O_5 94 as Nicifos.	N 94 P_2O_5 94 as N/chalk and B. Slag.	N 94 P_2O_5 94 as S. of Amm. and B. Slag.	N 94 P_2O_5 94 as S. of Amm. and Super-phosphate.	N 94 as Nitro chalk.	N 94 as S. of Amm.	Significant Difference, 20: 1
	Pln. Rose Hall, Field 1 Field-Field A.						
Tons Cane/Acre	26.70	23.62	28.64	26.37	23.03	26.25	2.48
	Pln. Rose Hall, Field 31 Smithson.						
„ „ „	26.41	27.21	26.71	24.71	23.63	25.68	...

(A 9—A 12) Sulphate of Ammonia on Pegassy Clay (First, Second and Third Ratoons, P.O.J. 2878).

Fields 21 Gv., Wales; 43 E., Uitvlugt; 4 P., Cane Grove; and 31 E., Uitvlugt.

(*Plant cane results reported in Sugar Bull. No. 6, p. 72, No. 7, p. 79 and No. 8, p. 61.*)
(*First ratoon results reported in Sugar Bull. No. 7, p. 80.*)
(*Second ratoon results reported in Sugar Bull. No. 8, p. 62.*)

The differences between the treatment yields shown for the first three fields in Table XIX are not statistically significant and it must be concluded that heavier doses than 6 cwt. of sulphate of ammonia per acre should not be given to ratoons on pegassy clay. The results from the fourth field (31 E., Uitvlugt), however, confirm previous findings that on pegassy clay 6 cwt. will yield definite and remunerative increments over 4 cwt. (see Figure XIV).

Table XIX.

Effect of Sulphate of Ammonia on First, Second and Third Ratoons of P.O.J. 2878 on Pegassy Clay.

	Sulphate of Ammonia, per Acre,				Significant Difference, 20: 1
	4 Cwt.	6 Cwt.	8 Cwt.	10 Cwt.	
	Pln. Wales, Field 21 Gov. erwagting, First Ratoons.				
Tons Cane/Acre		33.32	34.57	36.20	...
	Pln. Uitvlugt, Field 43 East, First Ratoons.				
,, ,, ,,		32. 62	34.64	33.66	...
	Pln. Cane Grove, Field 4 Palmyra, Second Ratoons.				
,, ,, ,,		28.76	29.60	28.22	...
	Pln. Uitvlugt, Field 31 East, Third Ratoons.				
,, ,, ,,	22.44	25.49	27.17	...	2.41

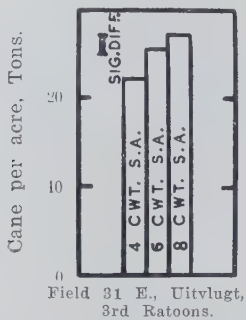


Fig. XIV.

Effect of Sulphate of Ammonia on P.O.J. 2878 on Pegassy Clay.

(A 13—A 16) Nitrogenous and Phosphatic Manures on Pegassy Clay (Second Ratoons, P.O.J. 2878).

Fields 10 C. (A and B), Wales; 64 Z., Uitvlugt; and 36 S.D., Cane Grove.

(*Plant cane results reported in Sugar Bull. No. 7, p. 84.*)
(*First ratoon results reported in Sugar Bull. No. 8, p. 63.*)

The results recorded in Tables XX and XXI, together with those previously reported from the plant canes, indicate that

(a) Nitrochalk, at equivalent nitrogen doses, gives the same yields as sulphate of ammonia;

(b) Nitrate of soda is also very similar to sulphate of ammonia in its effect on yield at equivalent nitrogen doses (on account of the local soil composition, however, it is felt that its long-continued use in heavy doses may prove dangerous);

(c) An average increment per crop of 7.35 tons of cane per acre may be expected from applications of 6 cwt. sulphate of ammonia to plants and ratoons on pegassy clay;

(d) Field 10 C., Wales, and, to an even greater extent, Field 36 S.D., Cane Grove, will yield paying responses to phosphatic applications;

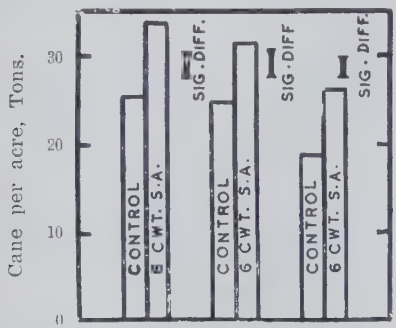
(e) Basic slag and Nitrochalk are as efficient as an equivalent application of Nicifos.

Points c and d are brought out in Figures XV and XVI, respectively. A discussion of the effect of three years fertiliser treatment on the soil reaction of the plots of these experiments will be found under Discussion and Summary.

TABLE XX.

Effect of Various Nitrogenous and Phosphatic Manures on Second Ratoons of P.O.J. 2878 on Pegassy Clay.

	lb. per Acre						Significant Difference, 20 : 1
	N 141 P_2O_5 141 as Nicifos.	N 141 P_2O_5 141 as N/chalk and B. Slag.	N 141 as Nitro-chalk.	N 141 as N/soda.	N 141 as S. of Amm.	Nil.	
			Pln. Wales, Field 10 Cottage (A).				
Tons Cane /Acre	26.65	29.14	26.42	30.28	26.29	20.43	3.45
			Pln. Wales, Field 10 Cottage (B).				
„ „ „	31.18	30.74	26.07	27.49	25.60	19.20	4.16
			Pln. Uitvlugt, Field 64 Zeeburg.				
„ „ „	26.96	25.54	24.64	25.67	26.78	17.06	3.89
			Combination of Three Trials.				
„ „ „	28.26	28.47	25.71	27.81	26.22	18.90	2.25



Mean Results from Fields 10 C. (A. & B.), Wales, and 64 and 69 Z, Uitvlugt,

Plants. 1st Ratoons. 2nd Ratoons.

FIG. XV.

Effect of Sulphate of Ammonia on P.O.J. 2878 on Pegassy Clay.

TABLE XXI.

Effect of Various Nitrogenous and Phosphatic Manures on Second Ratoons of P.O.J. 2878 on Pegassy Clay at Pln. Cane Grove.

	Lb. per Acre						Significant Difference, 20: 1
	N 141 P_2O_5 141 as Nicifos.*	N 141 P_2O_5 141 as Nicifos.	N 141 as Nitro-chalk.	N 141 as S. of Amm.*	N 141 as S. of Amm.	N 141 as N/soda.	
Tons Cane /Acre	36.45	33.64	25.69	23.84	25.16	24.22	3.19

*Plots had an application of pulverised limestone at the rate of one ton per acre as plants.

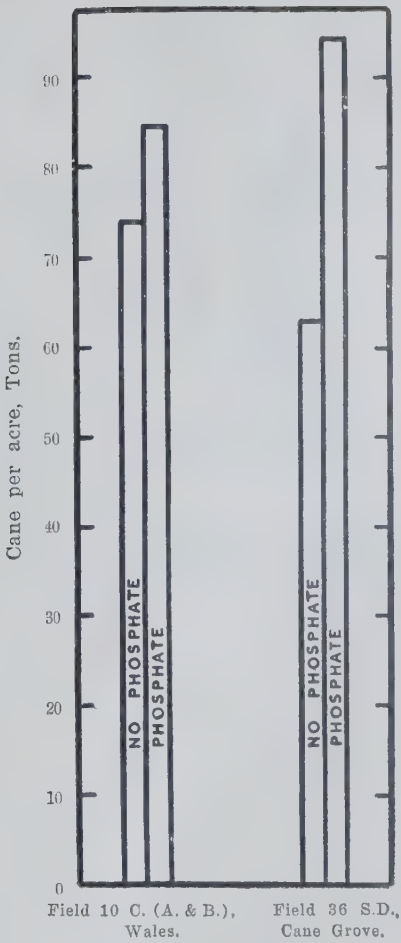


FIG. XVI.

Total Effect of Phosphate over Three Crops on P.O.J. 2878 on Pegassy Clay.

SUB-SECTION B.—PHOSPHATIC MANURES.

As stated in the introduction to the manurial section, the effects of nitrogenous and phosphatic manures in certain trials are discussed for convenience under A 3—A 8 and A 13—A 16.

(B 1—B 2) Superphosphate of Lime on Flood-fallowed Frontland (Second and Third Ratoons, P.O.J. 2878).

Fields 20 R., Port Mourant; and 26 Rp., Blairmont.

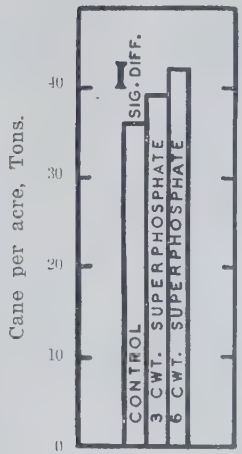
(*Plant cane results reported in Sugar Bull. No. 6, p. 82.*)
(*First ratoon results reported in Sugar Bull. No. 7, p. 94 and No. 8, p. 68.*)
(*Second ratoon results reported in Sugar Bull. No. 8, p. 69.*)

It will be seen from Table XXII that the apparent increment due to phosphate applications at Port Mourant was not statistically significant. There had been no response to phosphate in the first ratoons. At Blairmont, on the other hand, phosphatic dressings had a definite effect as illustrated in Figure XVII. Thus, in this field, while there was no effect on the plant canes or first ratoons the second and third ratoons have responded. It has been suggested that the available iron released by flood-fallowing may have been sufficient to immobilise the first and second phosphate dressings but may have disappeared by the time the third and fourth were given.

Table XXII.

Effect of Superphosphate of Lime on Second and Third Ratoons of P.O.J. 2878 on Flood-fallowed Frontland.

	Superphosphate of Lime, per Acre,			Significant Difference,
	0 Cwt.	3 Cwt.	6 Cwt.	20:1
	Pln. Port Mourant, Field 20 R., Second Ratoons.			
Tons Cane/Acre	27.91	30.11	30.22	...
	Pln. Blairmont, Field 26 Rp., Third Ratoons.			
„ „ „	36.14	39.36	42.26	2.95



Field 26 Rp., Blairmont, 3rd Ratoons.

FIG. XVII.

Effect of Superphosphate of Lime on P.O.J. 2878 on Flood-fallowed Frontland.

(B 3—B 6) BASIC SLAG ON PEGASSY CLAY (FIRST, SECOND AND THIRD RATOONS, P.O.J. 2878).

Fields 21 Gv., Wales; 43 E., Uitvlugt; 4 P., Cane Grove; and 31 E., Uitvlugt.

(*Plant cane results reported in Sugar Bull. No. 6, p. 84, No. 7, p. 96, and No. 8, p. 70.*)
(*First ratoon results reported in Sugar Bull. No. 7, p. 96.*)
(*Second ratoon results reported in Sugar Bull. No. 8, p. 71.*)

Table XXIII summarises the results obtained from the latest reapings of these fields. At 21 Gv., Wales, the yield differences are not significant and neither these figures nor those from the plants warrant the application of phosphates to this area. At 43 E., Uitvlugt, (see also Figure XVIII) there has been a significant response in the first ratoons and as the increments secured in the plants were suggestive, though not significant, phosphatic dressings may be advised for this area. At 4 P., Cane Grove, neither the plant cane nor the second ratoon results (the first ratoons were also treated but not weighed) suggest that any benefits are to be obtained from phosphatic manuring. Similarly, phosphate applications cannot be advised for 31 E., Uitvlugt.

TABLE XXIII.

Effect of Basic Slag on First, Second and Third Ratoons of P.O.J. 2878 on Pegassy Clay.

	Basic Slag, per Acre,			Significant Difference,
	0 Cwt.	5 Cwt.	10 Cwt.	20 : 1
	Pln. Wales, Field 21 Goedverwagting, First Ratoons.			
Tons Cane/Acre	33.50	34.67	35.92	...
	Pln. Uitvlugt, Field 43 East, First Ratoons.			
,, ,, ,,	30.79	34.96	35.16	1.99
	Pln. Cane Grove, Field 4 Palmyra, Second Ratoons.			
,, ,, ,,	28.03	30.46	28.10	...
	Pln. Uitvlugt, Field 31 East, Third Ratoons.			
,, ,, ,,	24.45	25.12	25.54	...

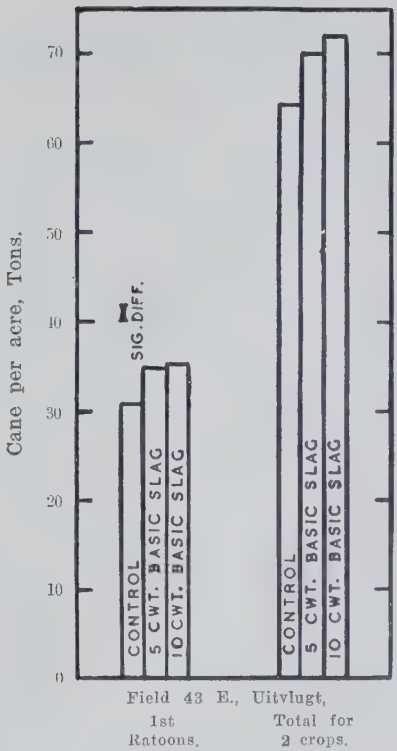


FIG. XVIII.

Effect of Basic Slag on P.O.J. 2878 on Pegassy Clay.

SUB-SECTION C.—POTASSIC MANURES.

(C 1—C 2) SULPHATE OF POTASH ON FLOOD-FALLOWED FRONTLAND (SECOND AND THIRD RATOONS, P.O.J. 2878).

Fields 20 R., Port Mourant; and 26 Rp., Blairmont.

(*Plant cane results reported in Sugar Bull. No. 6, p. 87.*)
(*First ratoon results reported in Sugar Bull. No. 7, p. 100 and No. 8, p. 72.*)
(*Second Ratoon results reported in Sugar Bull. No. 8, p. 74.*)

Table XXIV indicates that potassic dressings cannot be advised at 20 R., Port Mourant, or 26 Rp., Blairmont. At the former site a 2 cwt. dressing of sulphate of potash gave a yield almost significantly lower than the control and definitely lower than that from a 4 cwt. dressing. At the Blairmont site there had been no measurable response to potash in the plants or first ratoons and although in the second ratoons 4 cwt. was definitely better than the control, the increment secured was uneconomic. There was no suggestion of a response from the third ratoons.

TABLE XXIV.

Effect of Sulphate of Potash on Second and Third Ratoons of P.O.J. 2878 on Flood-fallowed Frontland.

	Sulphate of Potash, per Acre,			Significant Difference,
	0 Cwt.	2 Cwt.	4 Cwt.	20:1
	Pln. Port Mourant, Field 20 R., Second Ratoons			
Tons Cane/Acre	29.79	26.76	31.70	3.44
	Pln. Blairmont, Field 26. Rp., Third Ratoons.			
,, ,, ,,	39.73	37.96	40.07	...

(C 3—C 4) SULPHATE AND MURIATE OF POTASH ON PEGASSY CLAY (FIRST RATOONS, P.O.J. 2878).

Fields 21 Gv., Wales; and 43 E., Uitvlugt.

(*Plant cane results reported in Sugar Bull. No. 8, p. 76.*)

The results appearing in Table XXV confirm the plant cane findings that muriate of potash is preferable to sulphate under the conditions of these experiments. At Uitvlugt (Figure XIX) sulphate gave the same plant cane yield as the control but muriate gave a paying response. In the first ratoons both fertilisers improved the yield but the response from muriate, though not significantly so, was better than that from sulphate. Muriate of potash applications can be advised for 43 E., Uitvlugt. Even where there was an adverse effect (on the plant canes at Wales), the sulphate was definitely more deleterious than the muriate, and in the first ratoons the depressing effect has been converted to a slight, but statistically insignificant, increase with muriate above sulphate.

TABLE XXV.

Effect of Sulphate and Muriate of Potash on First Ratoons of P.O.J. 2878 on Pegassy Clay.

	Lb. per Acre			Significant Difference, 20 : 1
	Nil.	Potash 110 as Sulphate of Potash.	Potash 110 as Muriate of Potash	
	Pln. Wales, Field 21 Goedverwagting.			
Tons Cane/Acre	34.02	34.37	35.69	...
	Pln. Uitvlugt, Field 43 East.			
,, ,, ,,	31.51	33.93	35.46	1.99

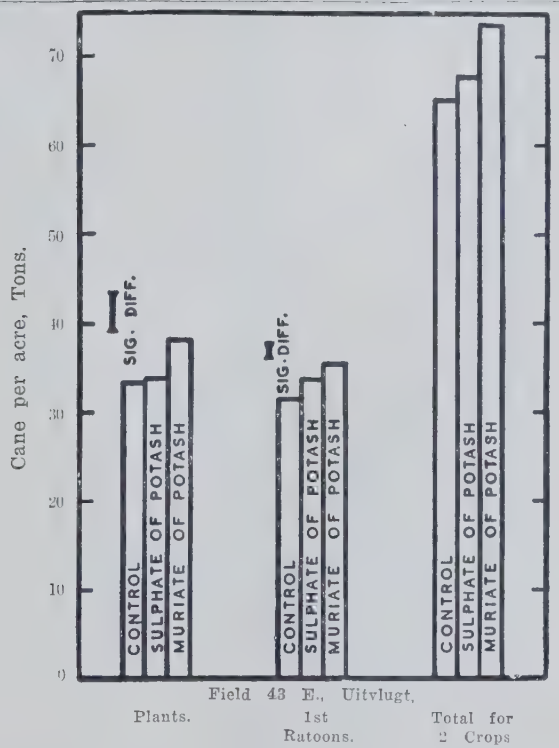


FIG. XIX.

Effect of Sulphate and Muriate of Potash on P.O.J. 2878 on Pegassy Clay.

(C 5—C 6) Sulphate of Potash on Pegassy Clay (Second and Third Ratoons, P.O.J. 2878).

Fields 4 P., Cane Grove; and 31 E., Uitvlugt.

(*Plant cane results reported in Sugar Bull. No. 6, p. 87. and No. 7, p. 101.*)
(*First ratoon results reported in Sugar Bull. No. 7, p. 103.*)
(*Second ratoon results reported in Sugar Bull. No. 8, p. 78.*)

The data in Table XXVI indicate a definite response to potash on the second ratoons at Cane Grove. In the plant canes the increments due to potash had been suggestive but not significant. The first ratoons were also treated but it was found impossible to weigh the plots. Potassic dressings are advised for this area and for Field 31 E., Uitvlugt, where sulphate of potash has yielded statistically significant responses in the plant canes, second and third ratoons (see also Fig. XX).

Table XXVI.

Effect of Sulphate of Potash on Second and Third Ratoons of P.O.J. 2878 on Pegassy Clay.

	Sulphate of Potash, per Acre,			Significant Difference,
	0 Cwt.	2 Cwt.	4 Cwt.	20 : 1
	Pln. Cane Grove, Field 4		*Palmyra, Second Ratoons.*	
Tons Cane/Acre	26.19	30.31	30.10	3.19
	Pln. Uitvlugt, Field 31		*East, Third Ratoons.*	
" " "	23.10	25.75	26.25	2.41

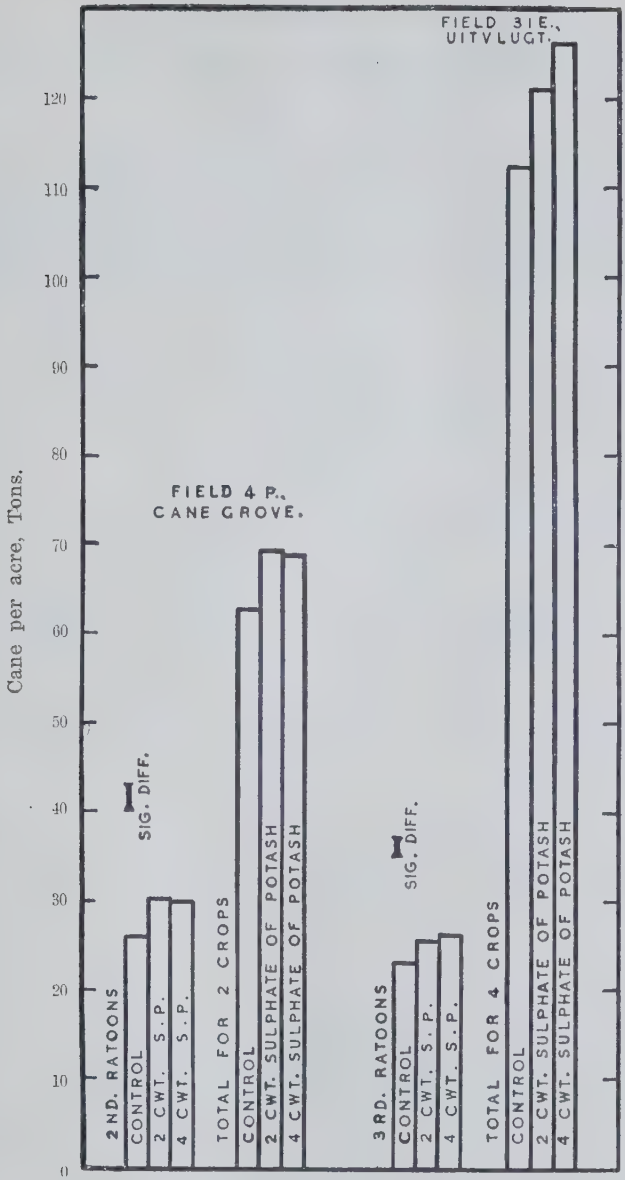


FIG. XX.

Effect of Sulphate of Potash on P.O.J. 2878 on Pegassy Clay.

SUB-SECTION D.—LIMING MATERIALS.

(D 1) Liming Materials on Flood-fallowed Frontland (Plant Canes, P.O.J. 2878).

Field 31 K., Albion.

This experiment forms one of a chain of long-term liming trials of which the plant and ratoon results of the first cycle have already been reported in *Sugar Bulletins* Nos. 5 to 8, inclusive. It will be remembered that in no trial was any definite response from the moderate dressings of lime and limestone established in the first cycle. It is therefore interesting to observe from Table XXVII and Figure XXI that whereas there were no definite differences, in the retreated plant canes of the second cycle, between the individual dressings of lime and limestone, there was a significant response to liming materials as against no-liming materials. If this result is confirmed in the other trials of the chain it will justify the practice of applying half to one ton of limestone at every replanting.

Table XXVII.

Effect of Liming Materials on Plant Canes of P.O.J. 2878 on Flood-fallowed Frontland (Previous Plant Canes Similarly treated).

	Control	Lime		Limestone		Lime and Limestone.	Significant Difference, 20 : 1
		½ Ton /Acre.	1 Ton /Acre.	½ Ton /Acre.	1 Ton /Acre.		
Tons Cane/Acre	19.93	23.13	22.69	24.51	24.27	...	...
,, ,, ,,	19.93	...	...	...	...	23.65	3.16

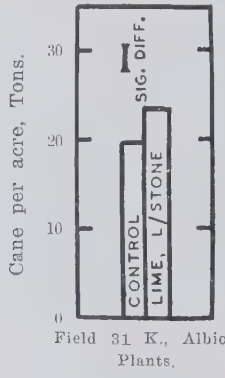


Fig. XXI.

Effect of Liming Materials on P.O.J. 2878 on Flood-fallowed Frontland.

SUB-SECTION E.—MANGANESE ORE.

Manganese Ore on Pegassy Clay (First Ratoons, Diamond 10).

Field 119 G.D., Diamond.

(Plant cane results reported in Sugar Bull. No. 8, p. 80.)

The plots which had received manganese ore as plant canes were retreated with similar doses as first ratoons but, as will be seen from Table XXVIII, there was no definite response. The use of manganese ore, under conditions similar to those of this trial, cannot be advised.

Table XXVIII.

Effect of Manganese Ore on First Ratoons of Diamond 10 on Pegassy Clay at Pln. Diamond.

	Manganese Ore, lb. per Acre			Significant Difference,
	0	50	100	20 : 1
Tons Cane/Acre	25.26	23.55	26.28	...

SUB-SECTION F.—DISCUSSION AND SUMMARY.

Effect of Fertilizers on Cane Quality.

It will be noted that, contrary to previous practice (*Sugar Bulletin* Nos. 1—8), the fertiliser trial results are reported only in terms of cane yield, the analysis of samples from each plot having been stopped as a measure of economy. It will be of interest at this stage to summarise the findings up to the time of cessation.

Applications of sulphate of ammonia affect adversely the sucrose content of the cane, the glucose ratio and the juice purity, the intensity of the effect varying directly with the rate of application. This point is brought out in Table XXIX where the results of more than two thousand analyses, representative of all the soil types of the Colony, of sixteen harvest seasons and of plant canes, first and second ratoons are combined. It should be emphasized, however, that, so far as doses of 2, 4 and 6 cwt. per acre of sulphate of ammonia are concerned (the doses recommended for plant canes and ratoons on flood-fallowed frontland, and for plants and all ratoons on pegassy clay, respectively) the decline in quality is not sufficient, under local conditions, to offset the definite increases in cane tonnage yielded by such dressings.

TABLE XXIX.

Effect of Sulphate of Ammonia on Cane Quality in British Guiana.

When the Application of Sulphate of Ammonia is increased from	The % Sucrose in Cane Falls by	The Glucose Ratio rises by	The Purity falls by
0 to 2 Cwt. per acre	.01	.29	.16
0 „ 4 „ „ „	.10	1.04‡	.71‡
0 „ 6 „ „ „	.23‡	1.42‡	1.05‡
0 „ 8 „ „ „	.51‡	2.26‡	1.70‡
2 „ 4 „ „ „	.13‡	.54‡	.53‡
2 „ 6 „ „ „	.23‡	1.03‡	.87‡
2 „ 8 „ „ „	.50‡	1.88‡	1.45‡
2 „ 10 „ „ „	1.11‡	3.17‡	4.20‡
4 „ 6 „ „ „	.11‡	.52‡	.38‡
4 „ 8 „ „ „	.46‡	1.26‡	1.05‡
4 „ 10 „ „ „	.90‡	2.55‡	2.78‡
6 „ 8 „ „ „	.15	.28	.35
6 „ 10 „ „ „	.24	.61	.67‡
8 „ 10 „ „ „	.26	.48	.59

‡ Statistically significant effect.

Borden (*Facts About Sugar*, June 1939, p. 34) has recently summarised the results of 289 nitrogen experiments carried out in the Hawaiian Islands from 1930–36, inclusive, and it is of interest to record his findings here :

Lbs. Nitrogen Applied	Tons cane per Ton Sugar (average 8.91)
50	8.79
100	8.77
150	8.84
200	8.89
250	8.99
300	9.03

The effects of phosphate, potash and liming materials on cane quality have not been as thoroughly investigated as those of nitrogen, but the following summarises the findings:—

Phosphates : In most trials there was no significant effect; in the others the cane quality sometimes improved, sometimes deteriorated. So far as is known then, under local conditions, phosphates do not consistently affect cane quality in any one direction.

Potash : In most trials there were no significant effects. In the few instances, however, where such did occur, there was a greater tendency for them to be beneficial.

Liming Materials : There was usually no definite effect on cane quality but in a few instances it was significantly beneficial in others significantly adverse. As in the case of phosphate, it must be assumed then that, under local conditions, liming materials do not consistently affect cane quality in any one direction.

It may be noted that Borden's (*loc. cit.*) figures for 300 phosphate and 289 potash tests indicate that neither element is likely to have a regularly deleterious or beneficial effect. His data are :

Lbs. P_2O_5 or K_2O Applied	Tons Cane per Ton Sugar	
	Phosphate Average 8.96	Potash Average 9.18
None	8.93	9.24
1 — 100	8.95	9.18
101 — 200	8.96	9.15
201 — 300	8.98	9.15
Over 300	8.98	9.19

Under Trinidad conditions, Turner (*Trop. Agriculture*, XIII, 299, 319; XIV, 63) has found that limestone dressings have an adverse effect on cane quality when conditions for ripening are unfavourable. Unfavourable ripening conditions occur quite frequently in British Guiana.

Effect of Fertilisers on the Reaction of Pegassy Clay.

The following comparisons of the reactions (determinations made by the Chemical Division, Dept. of Agriculture) of the top six inches of soil in the cane row after three years' treatment with various fertilisers are interesting and instructive:—

Table XXX.

Effect of Fertilisers on the Reaction of the Top Six Inches of Soil in the Cane Rows on Pegassy Clay.

Three Dressings of		64 Z., Uitvlugt		10 C.(A), Wales		10 C.(B), Wales		36 S.D., Cane Grove	
Fertiliser	Lb. per Acre *	pH							
		Normal	Exchange	Normal	Exchange	Normal	Exchange	Normal	Exchange
Sul. Amm.	672	4.85	3.61	4.56	3.68	4.50	3.71	4.13	3.43
Sul. Amm.	672								
L/stone	2240 *once*	...	...	...	...	...	...	4.36	3.56
Nitrochalk	888	5.15	4.02	4.93	3.90	5.11	4.06	4.53	3.57
Nitrochalk	888								
B. Slag	941	5.85	4.77	5.19	4.14	5.13	4.04	...	...
Nicifos	783	4.81	3.76	4.68	3.81	4.77	3.83	4.27	3.42
Nicifos	783								
L/Stone	2240 *once*	...	...	...	...	...	...	4.42	3.59
N. Soda	855	5.64	4.11	4.94	3.77	5.33	3.94	4.98	3.57
Control		5.27	4.04	4.93	3.84	4.91	3.86	...	...
Significant Diff. 20 : 1 :		0.32	0.41	0.27	0.24	0.18	0.18	0.21	0.12

* Doses arranged so that respective supplies of Nitrogen and Phosphate are equivalent.

These data indicate that :

(a) Sulphate of Ammonia definitely increases soil acidity but that one ton of limestone at planting will offset the acidifying effects of three 6 cwt.-dressings of sulphate of ammonia;

(b) Nicifos also acidifies, but slightly less than does sulphate of ammonia, and that one ton of limestone at planting will offset the acidifying effects of three 7 cwt.-dressings;

(c) Nitrochalk dressings do not alter the soil reaction;

(d) Nitrate of soda tends to render the soil alkaline;

(e) Basic slag definitely raises both the normal and exchange pH.

Nitrogenous Manures.

Frontland.

Former experiments have been still further confirmed and minimum dressings of 2 cwt. sulphate of ammonia per acre to plants and 4 cwt. to each ratoon crop can confidently be recommended.

Occasional experiments have indicated that even higher doses may sometimes pay and, indeed, some estates are already exceeding the minima suggested; it is therefore of interest to consider the possibility of further increases.

An examination of the mean data from all the plant cane trials harvested to date shows that increasing the application from two to four cwt., and again to 6 cwt., per acre, does not enhance the yield. In consequence, the application of more than two cwt. of sulphate of ammonia to plant canes cannot be advised.

On the other hand, grouping first, second and third ratoon data for many trials over several seasons, it is found that raising the dressing from four to six cwt. of sulphate of ammonia leads to an average increment of 1.79 tons cane. This also would not prove remunerative, but if the major portion of the increment were obtained, as might be expected from the law of diminishing returns, from the first extra cwt. then it might prove feasible to raise the dose from four to five cwt. This point was tested by fitting a curved regression to the data and it will be seen from Figure XXII that dressings of five cwt. of sulphate of ammonia to ratoons are, indeed, likely to prove remunerative in normal times, for the extra cwt. (4 to 5) will bring in nearly one and a half tons of cane more, on which a satisfactory profit can normally be earned.

In view of these findings, it is possible to advise, under pre-war conditions:

For Plant Canes .....2 cwt. sulphate of ammonia per acre.

For Ratoons .....5 cwt. sulphate of ammonia per acre.

Under war conditions the economic dose may have to be altered from time to time as prices for sugar and fertilisers fluctuate.

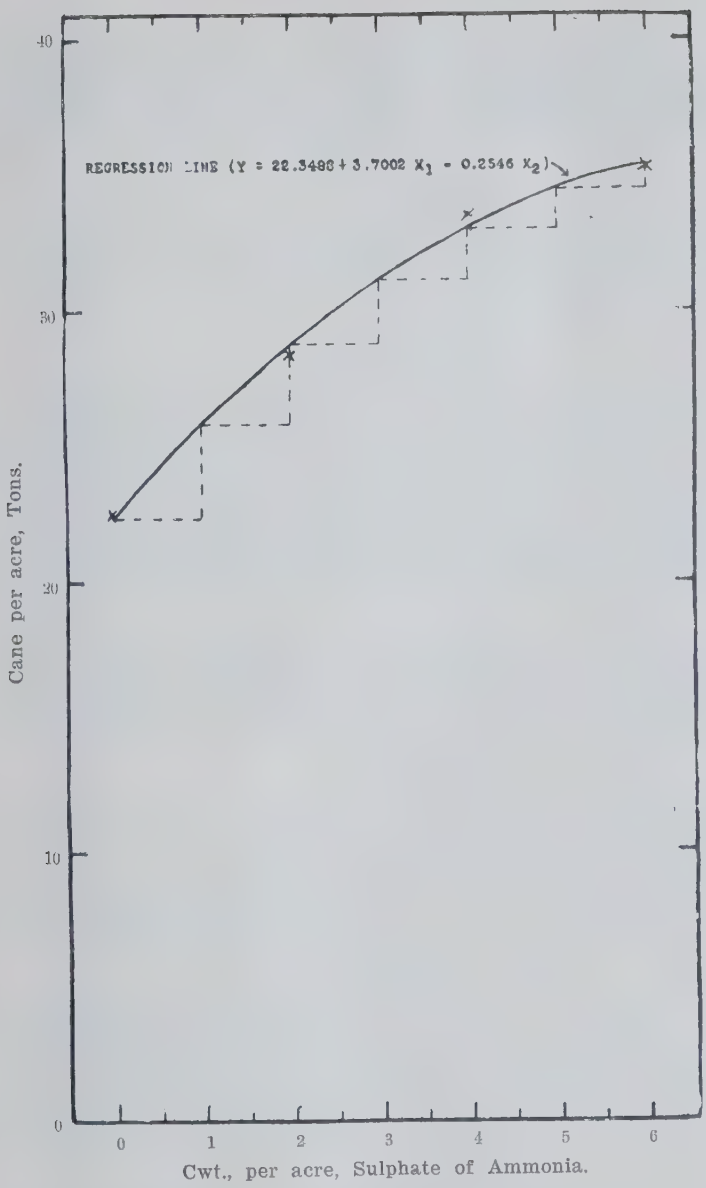


FIG. XXII.

Effect of Sulphate of Ammonia on First to Third Ratoons on Flood-fallowed Frontland.

Pegassy Clay.

Further results support the recommended dose, under normal price conditions, of six cwt. sulphate of ammonia per acre to plants and all ratoons. Such doses should be accompanied by dressings of at least a ton of limestone per acre to the plant canes, to offset the acidifying effects of the ammonium sulphate.

Substitutes for Sulphate of Ammonia.

Additional evidence is available that the effects of nitrochalk, nicifos and nitrate of soda approximate closely to those of sulphate of ammonia when applied at equivalent nitrogen doses. The tests with nitrate of soda, however, were mostly confined to pegassy clay.

Phosphatic Manures.

Frontland.

At Blairmont, there was a definite but uneconomic response to phosphate in Field 23 Rp. A response from second ratoons in another field of this section (26 Rp.) was reported in *Sugar Bulletin* No. 8, and as the third ratoon results now recorded also show a definite increment it is proposed to continue phosphate tests in this area. Responses at other sites were nil or erratic and it is evident that a great deal more work remains to be done and already a number of new field trials and a programme of laboratory investigations (by the Chemistry Division, Dept. of Agriculture) have been started.

Pegassy Clay.

Definite responses have been obtained at Fields 10 C., Wales; 36 S.D., Cane Grove; and 43 E., Uitvlugt. In consequence phosphatic manuring can be advised on these areas. As stated above, further field and laboratory investigations with phosphates have been started.

Potassic Manures.

Tests with sulphate of potash on flood-fallowed frontland at Port Mourant and Blairmont failed to yield any economic response.

On pegassy clay further evidence was obtained of the superiority of muriate to sulphate of potash and dressings of the former are advised for Fields 31 and 43 E., Uitvlugt (probably the whole section will respond), and 4 P., Cane Grove.

Liming Materials.

The chain of long-term trials with moderate doses of lime and limestone has just begun its second cycle and the plots have been relimed for the plant cane crop. One trial of the chain was reaped as plants during the period and there was a definite response of 3.72 tons of cane per acre to liming materials. If this important result is confirmed in the other trials of the chain, it will justify the practice of applying half to one ton of limestone at every replanting.

Manganese Ore.

Applications of 50 and 100 lb. per acre of manganese ore to plant canes and first ratoons on pegassy clay at Diamond have had no definite effect on the yield of either crop.

THE VARIETY AND FERTILISER POSITION OF THE SUGAR INDUSTRY, VI.

By

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Sugar Agronomist and Plant Breeder.

ESTATE YIELDS.

Statistics of the yields secured by the sugar estates during 1939 have been kindly supplied by the Managers, and in Table I the 1934-1939 yields of P.O.J. 2878 and Diamond 10 (the only varieties now covering important areas) are compared. These commercial results from large areas over six years confirm the superiority of P.O.J. 2878 and explain its popularity. It may be added that it is the general experience that the difference in third ratoons, in favour of P.O.J. 2878, is even more marked.

TABLE I.

Weighted Mean Yields of 96° Sugar per English Acre from P.O.J. 2878 and Diamond 10 in British Guiana, 1934-1939.

		Frontland Soils.		Pegasse Soils.	
		P.O.J. 2878	Diamond 10	P.O.J. 2878	Diamond 10
Plant Canes	Acres reaped:	22,268.9	35,073.6	6,509.7	4,456.0
	Yield of sugar per acre, tons:	3.85	3.62	3.42	3.63
First Ratoons	Acres reaped:	14,668.3	30,709.8	4,551.0	4,636.7
	Yield of sugar per acre, tons:	3.36	3.10	3.27	2.96
Second Ratoons	Acres reaped:	9,059.4	23,306.9	2,874.2	3,256.0
	Yield of sugar per acre, tons:	3.07	2.90	2.90	2.65
Three Crops	Total Yield of sugar per acre, tons:	10.28	9.62	9.59	9.24

VARIETAL COMPOSITION OF THE 1940 HARVESTS

Table II is compiled from the returns supplied by the estates and shows, as does Figure I, the relative importance, by area, of the varieties to be harvested in 1940. No variety returns are available from the small cane farmers who, it is estimated, will harvest about 1,300 acres.

TABLE II.

Percentage Distribution of the Varieties to be Reaped During 1940.

Variety.	Total English Acres in the Colony.	Percentage in West Demerara.	Percentage along Demerara River Banks.	Percentage in East Demerara.	Percentage in Berbice.
P.O.J. 2878	37,506.26 (57.6%)	11.9	7.8	31.3	49.0
Diamond 10	24,162.42 (37.1%)	21.4	40.3	17.9	20.4
D. 625	1,803.92 (2.8%)	...	20.1	6.2	73.7
Other canes	1,239.50 (1.9%)	19.0	51.8	13.8	15.4
Mixed	353.93 (0.6%)	10.1	55.6	1.2	33.1
	65,066.03 (100.%)				

As compared with the previous year, the total area to be harvested on the estates has increased by 3,258 acres. The area in P.O.J. 2878 has increased by 9,274 acres and this cane has absorbed the whole of the general increase in acreage as well as the substantial decreases of 2,702 and 3,134 acres in the areas devoted to Diamond 10 and D. 625, respectively. The indications are that Diamond 10 reached its maximum area in 1939 and is unlikely to expand further. D. 625 has been almost completely displaced and there is a further welcome drop in the 'mixed' areas. The developments of recent years are brought out in Table III.

TABLE III.

Comparison of Areas of D. 625, Diamond 10, P.O.J. 2878 and "Mixed" in the Colony During Recent Years.

Variety.	Per Cent. of Total Area in the Colony.						
	1934	1935	1936	1937	1938	1939	1940
D. 625	62.5	55.4	44.6	33.0	20.6	8.0	2.8
Diamond 10	16.8	22.7	29.4	36.6	41.3	43.5	37.1
P.O.J. 2878	1.4	4.7	9.7	19.2	31.7	45.7	57.6
"Mixed"	9.5	12.6	12.7	8.8	4.0	0.8	0.6

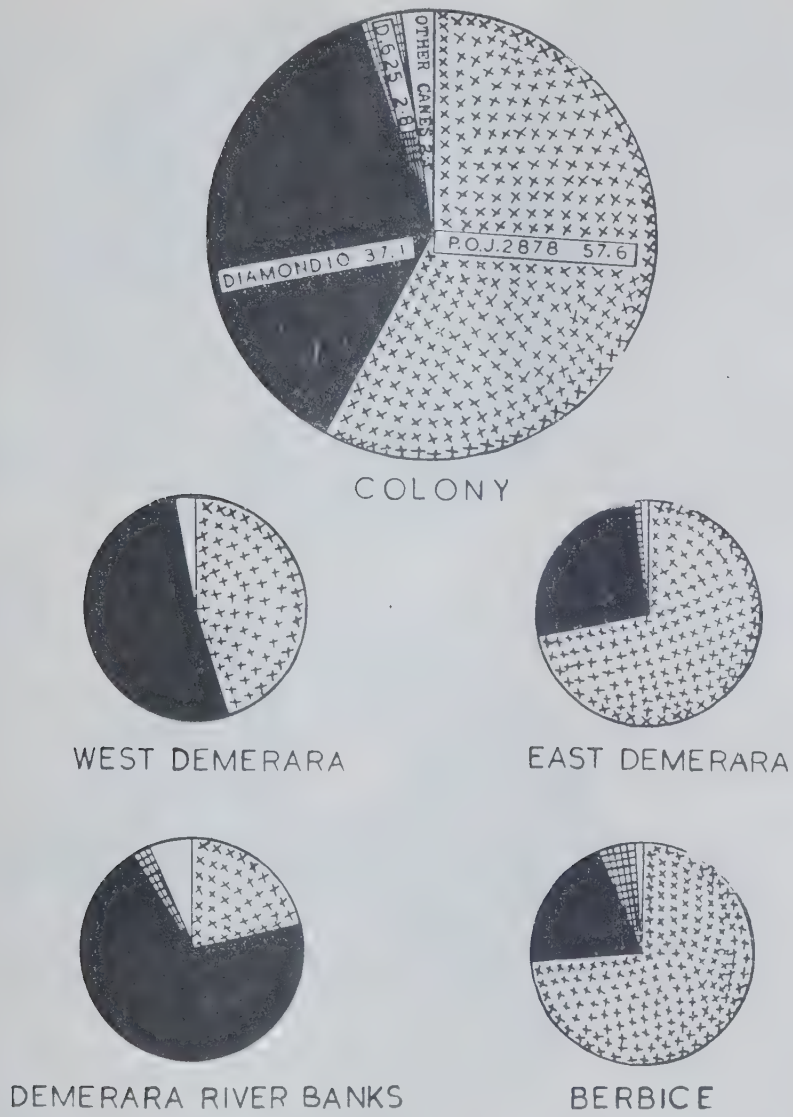

FIG. I.

Relative Varietal Composition of the Cane Areas to be harvested in British Guiana in 1940.

Although slightly more difficult to handle than that of Diamond 10, the juice of P.O.J. 2878 has never, until during the past few months, given much trouble in the factory. It has been suggested that this comparative immunity, as compared with some of the neighbouring islands, was due to the fact that in British Guiana, thanks to a high average rainfall and to irrigation facilities, the cane rarely receives the severe check from drought that is frequent elsewhere. During recent months, however, the drought has been prolonged and severe and juices have been refractory. It is interesting to note, nevertheless, that the trouble has not been entirely confined to P.O.J. 2878 (Diamond 10 having given trouble at some points as well) and that on two large estates where irrigation facilities permitted normal growth to proceed, there were no unusual manufacturing difficulties.

COMMERCIAL TESTS WITH NEW VARIETIES

As was mentioned in the last article of this series (*Ag. Jnl. of B.G.*, X, No. 3, p. 139), several estates are harvesting small areas of the newer seedlings on a commercial scale, and the following summarises the information secured in 1939.

D. 602/22

At Pln. Versailles, two acres of plants averaged 3.57 tons of sugar per acre and 10.51 acres of ratoons 2.34 tons in the Spring crop, while five acres of ratoons averaged 2.66 tons in the Autumn.

D. 11/28

Eight acres of second ratoons at Pln. Skeldon averaged only 1.10 tons sugar per acre.

D. 49/30

Pln. Diamond reports a yield of 5.10 tons sugar per acre from 22.4 acres of plants and 2.77 tons from 5.8 acres of first ratoons. At Pln. Lusignan 9 acres of plants averaged 3.06 tons sugar per acre. A small area of second ratoons at Pln. Providence (Berbice) only yielded 1.52 tons sugar per acre, but at Pln. Skeldon 4.47 acres of second ratoons averaged 3.8 tons per acre. The data from replicated plot tests and the field-scale trials in 1938 and 1939 suggest that this cane should be given a more extended trial.

D. 66/30

This seedling has been tested at Plns. Skeldon, Albion, Providence (Berbice), Blairmont, Bath, La Bonne Intention, Ogle, Diamond, Wales and Versailles. From 76.8 acres of plants it averaged 3.63 tons sugar per acre; from 72.3 acres of first ratoons it averaged 2.77 tons; and from 21.3 acres of second ratoons it averaged 3.74 tons. At this rate the general average for a three-crop cycle would be 3.38 tons sugar per acre, a figure above the Colony's present average output.

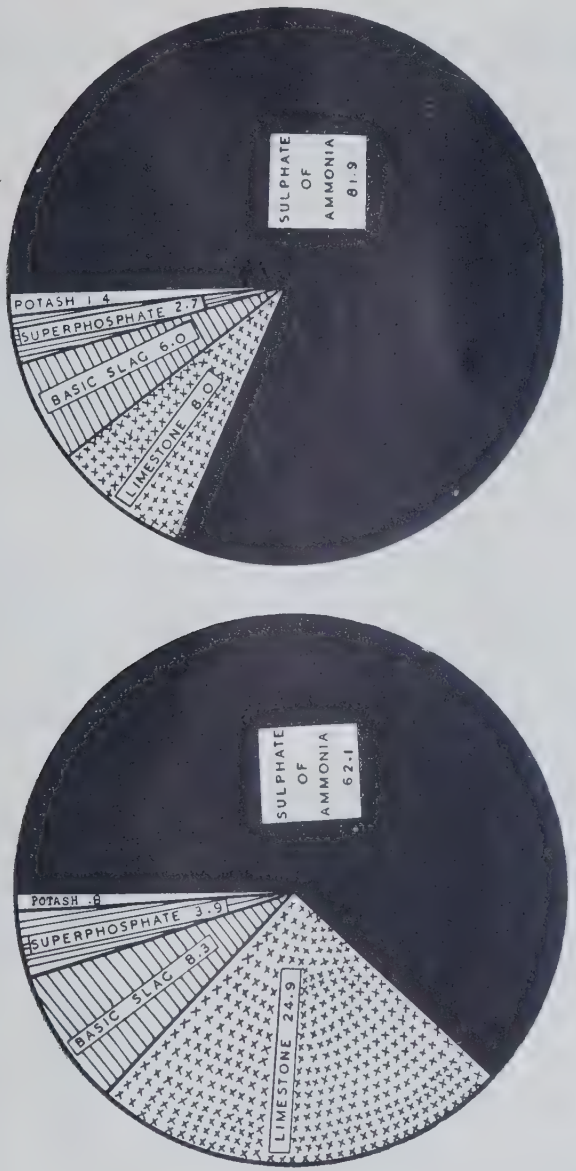

FIG. II.

Relative Quantities and Values of Fertilisers used on British Guiana Sugar Estates in 1939.

D. 75/30

At Pln. Leonora, 2.63 acres of plants averaged 4.95 tons sugar per acre.

D. 456/33

At Pln. Versailles, 1.7 acres of plants yielded at the rate of 5.4 tons sugar per acre.

Co. 213

At Pln. Lusignan, one 9.5-acre field of plants yielded 3.36 tons sugar per acre and another 9-acre field 2.83 tons per acre, while at Pln. Wales, 4.2 acres of plants yielded 2.14 tons of sugar per acre. At Pln. Providence (Berbice) 5.25 acres of first ratoons averaged 3.13 tons. A total of 11.8 acres of second ratoons, at Plns. Skeldon and Blairmont, averaged 3.67 tons of sugar per acre and 3 acres of third ratoons at Pln. Cane Grove averaged 2.41 tons. The field-scale trials with this cane harvested in 1938 and 1939 tend to confirm the impression gained from the replicated plot tests, *i.e.*, that Co. 213 can be of considerable service to the local industry.

FERTILISERS IN 1939

Table IV shows the fertiliser imports (adapted from the Reports of the Comptroller of Customs) for the past ten years. It will be seen that in 1939 there was a record importation of sulphate of ammonia and that that of manurial lime was higher than in the previous three years, falling only 122 tons short of the 1935 record. On the other hand imports of 'other fertilisers' continue to decrease. Prices of all fertilisers in 1939 were very similar to but slightly below those of 1938.

The estates have kindly supplied details as to the various manures used in 1939 and the data for 1937 to 1939 are summarised in Table V. It is of interest to note that lime has now been completely replaced by limestone. Figure II is a graphical presentation of the 1939 returns.

TABLE IV.

Fertilisers Imported into British Guiana in Recent Years.

Years.	Nitrogenous Fertilisers (almost entirely Sulphate of Ammonia).			Manurial Lime and Limestone.			Other Fertilisers (mainly Superphosphate and Basic Slag with some Sulphate of Potash).			Total Imports.	
	Tons.	Value $	Value per Ton, $	Tons.	Value $	Value per Ton, $	Tons.	Value $	Value per Ton, $	Tons	Value $
1930	7,207	316,158	43.87	2,754	27,394	9.95	2,624	62,069	23.65	12,585	405,621
1931	7,165	249,107	34.77	3,239	32,984	10.18	3,226	83,460	25.87	13,630	365,551
1932	8,294	254,726	30.71	4,366	42,071	9.64	2,619	54,281	20.73	15,279	351,078
1933	7,681	263,456	34.30	4,749	42,569	8.96	2,937	76,617	26.09	15,367	382,642
1934	7,727	248,185	32.12	4,306	38,524	8.95	2,168	48,735	22.48	14,201	335,444
1935	10,268	333,732	32.50	4,917	39,521	8.04	3,096	60,812	19.64	18,281	434,065
1936	9,963	334,556	33.58	3,786	28,453	7.52	2,639*	52,092*	19.74	16,388	415,101
1937	11,171	367,689	32.91	4,537	33,342	7.35	2,537*	49,509*	19.51	18,245	450,540
1938	10,205	356,068	34.89	3,755	27,131	7.23	2,199*	46,821*	21.29	16,159	430,020
1939	11,720	401,847	34.29	4,795	33,609	7.01	2,033*	42,838*	21.07	18,548	478,294
Mean	9,140	312,552	34.39	4,120	34,560	8.48	2,608	57,723	22.01	15,868	404,836
% of Mean Annual Imports:	57.60	77.20		25.96	8.54		16.44	14.26			

*Includes
1936: 152 tons of Sulphate of Potash, valued at $ 6,652 or $43.76 per Ton.
1937: 160 " " " " " , " " $ 6,929 or $43.31 per Ton.
1938: 234 " " " " " , " " $10,196 or $43.57 per Ton,
1939: 96 " " " " " , " " $ 4,155 or $43.28 per Ton.

TABLE V.

Values and Quantities of Fertilisers used on British Guiana Sugar Estates, 1937—1939.

Fertiliser.	$			Per cent. of Total Expenditure.			Per Ton $			Tons.			Per cent. of Total Imports.		
	1937	1938	1939	1937	1938	1939	1937	1938	1939	1937	1938	1939	1937	1938	1939
Sulphate of Ammonia	375,273.90	410,057.89	424,614.86	79.1	82.6	81.9	38.16	40.15	40.59	9,834.65	10,212.47	10,460.32	60.2	62.6	62.1
Lime	6,861.58	...	...	1.4	...	...	11.55	...	...	593.92	...	...	3.6	...	...
Basic Slag	34,465.03	28,905.38	31,208.30	7.3	5.8	6.0	21.58	20.30	22.46	1,596.80	1,423.99	1,389.25	9.8	8.7	8.3
Superphosphate	13,960.48	12,166.14	14,107.18	2.9	2.5	2.7	20.62	21.54	21.75	676.92	564.85	648.60	4.1	3.5	3.9
Limestone	35,241.44	38,237.47	41,233.48	7.4	7.7	8.0	10.18	9.66	9.85	3,461.99	3,958.40	4,186.97	21.2	24.3	24.9
Sulphate of Potash	8,481.43	6,647.60	7,097.87	1.8	1.3	1.4	49.11	46.68	48.28	172.71	142.40	147.00	1.1	0.9	0.8
Miscellaneous	331.25	350.84	57.83	0.1	0.1	...	...	...	...	5.00	5.30	0.92	...	...	...
TOTAL ...	474,615.11	496,365.32	518,319.52	100.0	100.0	100.0	...	...	...	16,341.99	16,307.41	16,833.06	100.0	100.0	100.0